JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

The Advocacy of the Public Press.

IT is a sign of the times that the daily and weekly newspapers should be taking more notice than has been their wont of the two principal artificial illuminating agents. This evinces a recognition of the fact that these illuminating agents are of the necessaries of daily existence just as much as many articles of consumption that there is no need to enumerate. On the raising of the question of adulteration of whisky, or of the shortcomings of a tinned beef firm, columns upon columns of the daily papers have been devoted to it. Gas has a universality in use, that cannot be boasted by either whisky or tinned meat. Hitherto, however, the public newspapers have not thought fit to regard its advances as a subject worth much public attention. There has been a change just recently. But there has been seen the old common failing of the daily newspaper journalists to be credulous, and precipitate in presenting views, when something that offers fresh topic is put before them. The electric metallic filament lamp is a case in point. A certain popular halfpenny newspaper, and a number of provincial contemporaries, swallowed, without hearing both sides, some claims made as to the latest invention having crowned electricity with an economical superiority among the illuminating agents. A little more discretion and judgment would have saved the papers in question the ridicule to which they exposed themselves. It is refreshing to see in the "Daily Tele-"graph" an article written in popular vein, but manifestly with a sense of responsibility animating the writer, in which an examination is made of the position, as economical agents, of the rivals gas and electricity. It is a pleasure for us to acknowledge the independent tone of the article. Most of the points made are quite familiar to "JOURNAL" readers; but we have reproduced the article as an example of fair exposition of the subject by a widely read paper of acknowledged high standing.

The writer confines himself to the present; he will not speak with any certainty as to the future. There may be a time when electricity may dominate, and gas be subverted. But those of us who actively move in the gas industry, and are able, from the indications and the technical knowledge of the day, to exercise some amount of penetration, are quite satisfied that the "inherent vitality and active development "of the gas industry," of which there is abundant evidence to-day, will continue. "Feverish as the attempt has been "to outstrip the old force, the old force has shown itself "capable of sustained and successful resistance. It abides "on its merits." There have been repeated attacks from the electricians to win a greater share of the gains of the gas industry. But those repeated attacks have been repulsed; and the older agent has continued to add many cubits to its stature. Cheapness in relation to efficiency is the backbone of the gas industry. Of this fact the administrators and the technicians of the industry do not for a moment lose sight; and they are working as energetically as ever in keeping, in this respect, a wide division between their own commodity and the rival. In the race, electricity is severely handicapped by its costliness and innate imperfections; and while gas prices are being reduced, the necessity has arisen in many places to advance the charges for electricity. Even so, by tortuous reasoning, figuring, and assumptions, the cost of electric lighting is made to come out, by those interested in the sale of electricity and lamps, at a cheaper rate than incandescent gas lighting. By plainer method, the contrary is easily demonstrated; and the practical man takes as the best of testimony his account in comparison with a neighbour using the competing illuminant, where use and illumination have something of a parity. Instances are given in the article from practical experience, showing that gas maintains the lead as an economical agent. It is also shown to be the more reliable; and as to the relative hygienic merits (which is claimed in other quarters to be a "vital matter" to gas suppliers), we read:

> **That the healthiness of an apartment is necessarily increased by the substitution of electricity for gas is not a safe assertion. The new Central Criminal Court is an illustration to the contrary. Apparently built on the best known principles, and electrically fitted throughout, it yet arouses bitter complaint on the score of ill-ventilation. Where human bodies are congregated, vitiating elements are exuded which, in the interests of health, should be dispelled. Artificial ventilation is therefore a necessity in all enclosed spaces which are inhabited. Gas, say the advocates of that commodity, ensures ventilation if properly regulated, and electricity does not. Therefore, before electricity can be said to equal gas hygienically, it must be developed in relation to new principles of ventilation.**

It is one of the constant complaints of electricity consumers that the expenses supplementary to the account for electricity are so heavy; and as "new principles of ventilation" are required to make interiors sanitary where electric lighting is employed, users of electricity must prepare for a not inconsiderable outlay to achieve such a desirable end.

Calorific Power Records from Tottenham.

INSTRUCTIVE is the article that Mr. Arthur Edgcome Brown contributes to our columns this week on the question of his experiences in testing, for forfeitures, the calorific power of the mixed coal and water gas supplied by the Tottenham and Edmonton Gas Company. This Company were, so far as our information goes, the first in the country to be subject to a calorific power test with penalty accompanying for breaches. But this penalty test is only based on an agreement with the District Councils in the area of supply; still it is absolutely binding on the Company. The Gaslight and Coke Company, however, will be, if their Bill goes through (as it is now firmly believed that it will do), the first to have such a test statutorily applied for town gas, though, of course, the various Power Gas Companies who obtained parliamentary rights of supply some years since had such tests imposed upon them for gas used for other than illuminating purposes. In passing, the thought occurs that there is one matter which should be safeguarded if it has not already been done; and it is that there should be positive assurance that only tests made at the prescribed testing-stations are used for penalty purposes. The Gaslight and Coke Company, in this matter, should not, of course, be exposed to the claim that samples of gas can be taken from any place on the distribution system, which place might be a dead-end. At the testing-stations fair average samples of the gas under distribution are obtainable.

It would have been extremely interesting if Mr. Brown had been in the position to give us comparable tests with the same type of instruments, made the same days at both the works of the Tottenham Company and at the testing-station three miles away. There are tabulated figures giving the results of tests, at different periods, at the works using a Boys calorimeter, and at the testing-station using a Junkers instrument; and, so far as they have worth for comparative purposes, the figures show a very fair uniformity between the results at the works and at the testing-station, assuming that the proportions of the water gas and coal gas used in the corresponding quarters were about similar. The standard at Tottenham is 450 B.Th.U. net, which is the penalty line of the Gaslight and Coke Company at 112½ calories (125 calories net being the standard, less 10 per cent. before forfeiture is incurred). Although the Tottenham gas contains a large proportion of water gas, the nearest approach in the period of the works tests to 450 B.Th.U. was the minimum figure of 469 B.Th.U. in the fourth quarter of 1907; and in the period of the testing-station tests, 465 B.Th.U. in the third quarter of 1908. From his experience, Mr. Brown agrees that compliance with a standard of 125 calories net per cubic foot is not to be expected from a mixed 14-candle power gas ("Metropolitan" No. 2 burner test),

even when kept considerably above the statutory limit, but that a standard of 112½ calories net per cubic foot is, under present working conditions, quite capable of being maintained. That is the view of the Gaslight and Coke Company; and it is the view that the study of the official calorific power testings in London for information only has generally led to, though the proportion of water gas used is probably not so great as at Tottenham.

The Expanding Scope of Gas-Works Business.

MUTABILITY is seen in the gas-works business as in other material conditions and affairs of life. The old order in the commercial work of a gas undertaking has long since been undergoing change; and every year witnesses the circumstances of the business receding further from the pre-existing routine and fixed practices. The flexibility that departure over the old boundaries has brought to light has been one of the amazing features of the history of the industry; and the flexibility shows no signs yet of a determinate end. The papers that were read at the meeting of the Eastern Counties Gas Managers' Association last Wednesday—the one by Mr. W. J. Carpenter on "Gas Practice at Great Yarmouth," and the other by Mr. J. H. Troughton on "Tar for Roads, "Drives, Garden Paths, &c."—are, in the facts they present, alive with the testimony of the gain already accrued by change, and the possibilities still lying around. They also exhibit the importance of not dismissing the little things which, in the aggregate, go to make up something substantial. The commodities with which a gas undertaking has to deal are many; and, again and again, some thinker and business inventor is showing his colleagues where fresh profitable business is to be captured through the instrumentality of one or other of these products of carbonization. Not long since, the subject of retailing coke in small quantities was shown to be a business worth cultivating; and to this Mr. Carpenter adds a long history of successful enterprise in the same direction. Now Mr. Troughton instances how a business, in which there is money and employment, can be worked up in undertaking the making and keeping in repair of garden walks and drives through the waste of gas-works—slag, ashes, and unsaleable breeze—and by the aid of tar, over the disposal of which at a fair price there is so much difficulty. The ambition of every gas-works management should be to make the concern of the greatest use in its particular territory. The greater the number of the branches of usefulness, the greater becomes the indispensability of the undertaking, and the greater its power in the very seat of its operations.

These general thoughts run through the mind when considering the two papers—the one showing what has been done in the pursuit of business on liberal policy lines, the other suggestive of fresh expansion in one of the tributaries to the business and revenue of a gas undertaking. It has been a feature of the great vitality of the gas industry, that the evolution of the economies of production has proceeded concurrently with the broadening of the spirit of commercialism, which has pushed aside the old delimiting principles of conduct, and developed the seeking for business and the granting of facilities at one time undreamed of. In his works, Mr. Carpenter, with all modesty, does not claim any originality in the steps taken in achieving progressive economical operation. But what is not stated in the paper can be recognized here—that Mr. Carpenter, as the technical adviser of his Board, has not allowed himself or his works to get behind the best of modern practices in attaining, within the limits of situation and opportunity, the lowest costs and the highest working results. There are points in his statement of practice in this regard that will, when discussion on the paper is taken at the next meeting, be the subject of further inquiry.

It is, however, in the distribution and trading sections of the paper that the largest amount of interest is found. It is a generous but prudent policy that connects up the consumers with the gas undertaking at Great Yarmouth; and a generous policy in all areas must be the strongest of all bonds between gas consumer and supplier. There is something more than the mere shopkeeper in evidence at Yarmouth, through the provision of means for developing the sale of gas, out of which sale, rather than the appliances sold or let out on hire, the Company look for their reward on the enterprise. Hiring rates are purely nominal; and goods are sold at cost price. The slot consumer is not limited in his requirements. He may have as many lights as he desires; and a specially-constructed cooker, gas-fire, hot-plate, griller, &c., with boiling-rings are, as required, provided free. There is free fixing; the maintenance and repair departments are kept up to a high state of efficiency; and what is of paramount importance well-educated and properly equipped fitters are rightly considered essential. So much so is this the case, that the apprenticeship system was revived by the Company some four years since. We join Mr. Carpenter in his expression of regret that the apprenticeship system is not now a common practice throughout the country. It is, however, one of those slips from right to wrong that can be easily remedied, and on higher lines than ruled in olden times, in the case of gas-fitters. Among those who have set an excellent example in this respect may be mentioned the Gaslight and Coke Company and the London County Council, in their joint scheme, initiated by the former, for the apprenticing and training of lads as fitters—the Company providing the practical training, and the Council the technical education. The greater the growth of the work of a gas undertaking, the greater must be the devolution from the chief of responsibility in the matter of detail—that is to say, while his responsibility enlarges with business expansion, the more reliance must be placed by him on his subordinates in the matter of detail. And the happier must be the chief, and the better will the undertaking be served, the greater the sense of responsibility among, and the greater the efficiency for their individual parts of the work of, the whole of the employees.

Accompanying the paper are diagrams and tables that in themselves speak volumes as to changing conditions and the flexibility of the gas business. History is graphically and statistically represented. The influence of internal and external factors is shown—the persistence of the former in building up consumption; and the temporary depressing effect of the latter. In one diagram, the influence of the introduction in 1889 of cookers is seen. Progress is made in consumption. In 1894, electric lighting is introduced. There is a slight and temporary recession in consumption. But four years later—coin meters having also been introduced in the meantime—the previous highest peak of 1892 has been exceeded; and then the output shows rises of considerable magnitude to the present time. Great Yarmouth as a popular seaside resort is among the places that are more than ordinarily well circumstanced for the development of the day-load in the summer months, through the aid of the gas-cooker. The active development of the cooker business was only taken in hand in 1889. And what is seen as the result? Whereas in 1887 the ratio of the day consumption to total output was heaviest in the winter months, and as low as 15, 16, and 17 per cent. in the daytime in some of the warmest months of the year, in June and July last year the day consumption exceeded the night—the ratios to total output in those months being then respectively 51·45 and 51·21. In the ten other months of the year, the ratios of day consumption to total output ranged between 39·99 and 48·81. This is a remarkable reversal of condition produced by the changing circumstances of the past twenty years; and its effect on the capital and the working economies of manufacture will be immediately apparent to every practical gas man.

We cannot here follow Mr. Carpenter through his other commercial and working practices. A further opportunity for reference to them will occur when the paper is discussed six months hence. But sections of the paper that invite particular notice are the elimination, through frequent collection from slot meters, of robbery and the loss occasioned by the repair of damage, and the gratifying experience of twenty years' work in the sale of broken coke in small quantities, delivered direct to consumers' houses. In Mr. Carpenter, the "New Commercialism" and the Commercial Sections of District Associations have a strong advocate. "May I," he remarks in a concluding paragraph, "emphasize the importance of the maintenance of strict attention "to minute detail in all affairs affecting the conduct of the "concerns we represent." The paper proves that the writer fully practises what he preaches.

It is the business of a gas undertaking to create new custom, and to get the best possible price for all its products. It stands to reason that the greater the quantity of residual products that can be sold locally, the higher the price realized than when the cost of transmission over long distances has to be paid, and the commodity brought into competition with production in the immediate neighbourhood of sale. We like the little idea that Mr. Troughton

puts forward on more than one ground. As remarked earlier in this article, the greater the usefulness of a gas undertaking in its own district, and the more its operations bring it into contact in different directions with householders, the better. It is a new business for a gas concern to undertake the making and the upkeep of garden paths, drives, &c. But a gas-works produces, in addition to tar, practically all the other materials required for the purpose; and there is no reason why gas-works employees should not become specialists in this work, and create a new outlet for a portion of the material produced in the course of gas manufacture. There is profit in it; and it is also work that fits in well when the busy gas-making season is over. Thus in it there are the means of employment for many gas-works hands, who would otherwise be thrown among the unemployed, and on their own resources, in the summer months. Only last summer, Mr. Troughton advertised that his Company were prepared to undertake work in the making of tar-surfaced garden paths and drives; and this advertisement and a testimonial from one customer brought him twenty orders ranging in value from £2 to £30. This is a business—not only in the making of paths, but in renovation and upkeep generally—that will grow with the satisfactory experience. Nothing in the way of business should be too small for gas companies, providing it comes within the scope of the application of their products. Mr. Troughton's experience is not a large one; but it is suggestive; and he also gives hints as to the manner of carrying out the work. In the discussion of the paper, the cardinal feature was generally disregarded. The one that seemed uppermost in mind was the larger question of the sale of tar for road purposes. It is gratifying to hear of the universality of the employment of tar for both road construction and surface painting, and of the enlargement of the demand for the product for such purposes. But words of advice are required in certain directions; and they are: "Encourage this demand "now." The wisdom of doing so will be seen clearly later on, if not altogether appreciated to-day.

Views not Commonly Approved.

It is a proper thing for the occupant of a presidential chair to have the courage of his convictions, and to bring them into the light of day. Mr. W. Brown, of Lasswade, as President of the Waverley Association of Gas Managers, in his address, gave expression to opinions that will not be generally subscribed to. He is, in fact, in places not altogether logical in his arguments and submissions. It is his proper opinion that the aim and ambition of all in the gas industry should be to try and improve themselves and those with whom they come in contact. He therefore believes in every man attaining as much knowledge as his opportunities will allow. But there is no use showing envy and hatred towards those to whom the Fates have been beneficently disposed, and who have made proper use of their opportunities. There is, though our duty is "to improve "ourselves and those with whom we come in contact," a trace of light esteem for technical education in these presidential words: "There seems to be a feeling abroad that "anyone can be a gas manager; and I think it would be "well for our Association to look into the matter, for "evidently men who have by their ability shown their "worth are not wanted, and are being set aside for men "who are technically trained." We will not argue over the literal meanings of the terms employed. What Mr. Brown wished to convey is clear enough. We must, however, confess to not having observed the evidence of the rejection of men who by their ability have shown their worth. They are the men who are sought after, and the men the industry cannot afford to do without. There is also the suggestion in the quoted sentences that men possessing only technical education and not practical experience are appointed to the superior official positions. A bad thing indeed would it be for the gas industry were this so in fact. At heart, Mr. Brown has not any real antipathy to technical education; but he does hold—and we are all with him—that technical education must be accompanied by apprenticeship. A man with all the technical education that our colleges and technical schools can cram into him, is not the one for the post of chief official of a gas undertaking if he has not had a practical training, and rubbed shoulders with, and shared the working lot of, Tom, Dick, and Harry in every department of a gas-works' operations. If the choice were to be between technical education and practical training, then we should say give us the practical training; if the choice were to be between practical training on the one hand and practical training and technical education on the other, then we should say let us have the combination. There is every sympathy with Mr. Brown in his views as to the low salaries that are, with growing frequency, offered to those qualified for the positions of official responsibility—and it is a growing responsibility—in the gas industry; but we must claim that this niggardliness is much more apparent among municipal authorities than among companies. The reason for this need not be sought further than the changing constitution of our local governing authorities.

Mr. Brown got on to the old vexed question of differential prices. Many men who at one time possessed concrete views as to a uniform price for gas for all purposes have had their faith and their noble resolutions shattered by the inclemency of the competition of the present. Uniformity of price makes a respectable ideal; but it is impracticable if business is not to be sacrificed. Even where prices are low—say, at Widnes and Sheffield—it is found that differential prices possess an immense amount of persuasive virtue; more so than the ordinary price less a discount according to quantity used. Many an engineer can tell of the differential price having saved him consumers wavering between producer plant and town gas for industrial purposes, and the patronage of other large consumers astride the fence between gas and electricity, where the ordinary price, less varying discounts, which might or might not be reached according to the conditions of trade, would have failed. We have to-day to treat the purposes, as between industrial and domestic, as distinct departments of business, and apply an independent policy to each. These are not the days for sentiment, but for business. Mr. Brown does not think it is consistent that a person who uses gas for industrial power and heat should be supplied at (say) 1s. 6d. per 1000 cubic feet, while to another person the uniform rate is charged, simply because he uses it for light only. Nor do we think it at all right that the latter consumer, for whom Mr. Brown is so solicitous, should be robbed of the benefit to him of retaining for the undertaking the profit, whatever the amount, that the former gas consumer provides at the lower price, although for his purposes (from the point of view of cost) producer gas would answer. Other reasons why the lower price is justifiable were given—particularly by Mr. Henry O'Conner—in the discussion.

There is one other point. Mr. Brown cannot understand why the prepayment consumers should pay more than the ordinary consumers, though he fully appreciates that they entail more work and consequently cost and more capital expenditure. This, he says, is not the people's fault. Again, we say, Mr. Brown is not logical. He believes in uniform conditions of supply. Then why should he allow the prepayment consumer, who costs more to supply, to have gas at a price yielding, when all expenses are paid, a less profit than the ordinary consumer? By the amount that there is less profit on gas used for, as Acts of Parliament now put it, "like purposes," the ordinary—"ordinary" as distinct from exceptional—consumers of gas are injured. Where, however, gas administrators have any uneasiness of conscience over taking from slot consumers more in excess charge than is due for the additional expenditure incurred on their behalf, why not fix upon a total amount per annum or half year that will pay the outgoings special to a prepayment supply, and then return to each consumer all that he has paid above the value of the gas used at the ordinary price *plus* the fixed amount of additional charge? Some slot consumers might be tempted to burn more gas to experience the pleasant sensation of getting a few shillings returned (say) at Christmas time. There are a good many peculiarities in human character.

Gas and Electricity in South Africa.

Some of our readers may remember that towards the close of last year Mr. Henry Hack, late of Birmingham, left England for a tour in South Africa. He has now returned, and we are pleased to record that he has greatly benefited by the change. On his arrival at the Cape he received a cordial welcome from Mr. E. P. Reilly, the Engineer and General Manager of the Cape Town Gas Company, who assisted him in "seeing the sights," and gave him particulars of the gas supply. Mr. Hack availed himself of Mr. Reilly's hospitality, and he has recorded in an article

which appears elsewhere the results of his observations. Among the particulars furnished, it is interesting to find that the Gas Company are not regulated by any Act of Parliament, but are left to act according to their own judgment as to what is desirable to secure a demand for their commodity. They are not harassed by the municipal authorities, there is cordial co-operation among the officers, and the Manager is allowed to have a free hand in all things connected with his department; the local Director confining himself entirely to matters of policy. Consequently, it is not surprising to find that the Company's business methods are quite up-to-date. Of course, they have a powerful competitor in the shape of the municipal electricity supply undertaking, which is being pushed to the utmost; but there seems to be a good field for gas in the suburbs. It is not a little curious to read of several towns in South Africa—Durban among them—being lighted entirely by electricity. No doubt Mr. Reilly was pleased to have an opportunity of conversing upon gas topics with a professional colleague of Mr. Hack's standing; for, though he had kept himself well posted up through the medium of the "JOURNAL" and other technical sources, he confessed to feeling the need of an occasional visit to England to see for himself the latest things in the way of gas installations, and have intercourse with other gas engineers. The same need exists in the case of all managers of foreign and colonial gas-works, who will, we are sure, appreciate the sympathetic remarks on the subject made by Mr. Hack towards the close of his interesting communication.

Show-Room Attendants.

Show-room attendants play an important part in the commercial business of a gas undertaking in these times. It does not do to put any dunderhead and tactless individual in such a position. He must be a man specially gifted for such a purpose, and capable of exercising his gifts without obtruding them too much upon notice, and causing annoyance by the display of a sort of avalanche of superior knowledge. A writer in one of the electrical papers has been making a round of a number of electricity and gas show-rooms disguised (by word of mouth only) as the friend of a prospective resident in the neighbourhood, and, so far as his investigation carried him, he found the gas show-room attendant a more capable and qualified man than his compeer of the electricity undertaking. The results of his investigation are treated upon in our "Electricity Supply Memoranda," which, we hope, are found week by week helpful to show-room attendants of gas undertakings. To be up to the requirements of his business, the show-room attendant must not only be well-informed on the subject of the advances in the structure of gas apparatus and the progress in efficiency, but he must keep himself *au courant* with what is passing in the commercial sphere of the electrical competitor. From a study of the "Electricity Supply Memoranda" of the past twelve months, many useful points might be gleaned by those who have neglected to read the articles.

The Question of the Rates at Manchester.

The general body of citizens of Manchester, and their representatives in the Council, are still exercising themselves over the threatened increase in the rates owing to the falling off in the receipts from the Ship Canal and the growing demands of the Education Committee. Protests have been widespread, and all and sundry have been voicing their opinion that the rates must be kept down. To say this, however, is one thing; while to do it, may be quite another. Advice is always to be had for the asking; but it does not by any means necessarily follow that it is of a practical character. The finances of the Ship Canal and of the Education Committee must be to a very large extent beyond the control of the Council, who are compelled in these respects to take things as they find them. In directions where the exercise of economy is possible, the members are no doubt now—even if they have not always been—quite as anxious as anyone else that the expenditure should be cut down so far as may be done without endangering efficiency; but all that can be accomplished in this way will not, apparently, suffice to prevent at least an increase of 6d. in the pound on the rates. Not only is there increased expenditure foreshadowed, but the contributions to be received from some of the trading concerns are estimated at substantially smaller amounts. As a local paper remarks, "expenditure 'saved' one year has to be faced the next; and extra contributions forced from trading committees in 1908 mean lower contributions in 1909." It will be seen from our "Miscellaneous News" columns to-day that the Gas Committee, who last year handed over to the relief of the rates a sum of £60,000, instead of the customary £50,000 (thereby depleting their reserve fund), have come to the conclusion that for this year it will be impossible for them to give more than about £26,500, unless the price of gas is to be raised. Whether the spending estimates will be further reduced, or the trading committees will be induced to increase their promised contributions, remains to be seen. If the latter course should be adopted, and the prices of the various commodities, &c., have to be raised to meet this extra demand on the resources of the departments, it will, of course, only be increasing the rates in another, and far less satisfactory, form than a direct addition to the amount payable in the pound. Municipal undertakings, the same as other businesses, cannot expect to escape the consequences of trade depression; and thus it is that ratepayers are liable to be adversely affected precisely at the moment when it is least convenient for them to have any further burdens placed upon their shoulders.

Free Gas for Public Lighting.

Relative to the paragraph that appeared last week on this subject, our friends of the "Oldham Chronicle," in a further allusion to the matter, cannot see that the supplying of free gas to the public lamps and buildings of Oldham is an inequitable system to the gas consumers. The gas consumers have consistently provided the money for sinking fund and interest on all the loans required for the gas-works, they have found the money for the maintenance of the works, they have supplied the money for the payment of the rates and taxes under the assessment of the gas undertaking, and they have contributed money in aid of the rates. In fact, since the works have been in the hands of the Corporation about £390,000 has been transferred from gas profits in aid of the rates. The consumers have done well for Oldham. But the Corporation bleed them still further. They extract from their pockets payment for the gas made, distributed, and delivered for all public purposes. The value of the gas so used since the works were transferred to the Corporation is about £158,000. Is this equitable? We say "No;" the "Oldham Chronicle" says "It is." If our contemporary is right, then we do not understand the true meaning of "equity." Public lighting is a public service just as much as the sewerage system, road cleansing, and many other matters that could be mentioned. Every penny that it costs should be made a common charge. Our contemporary says the people of Oldham are responsible for the gas and electricity works, and on them "if anything happened which made large and sudden expenditure imperative, the cost would fall." Has anything happened up to the present making large and sudden expenditure imperative? If anything did happen, the gas consumers would have to bear it through an increase in the price of gas. Already in profits and in the value of gas taken without payment for public lighting, there has been a transfer from the gas undertaking of an amount exceeding the total of the sums borrowed for the purposes of the undertaking, and the capitalized value of the annuities. The so-called "responsibility" of the ratepayers of Oldham (which responsibility, in fact, has been shouldered solely by the gas consumers) has been well rewarded.

Is it Illegal?

If we cannot agree with the "Oldham Chronicle" regarding the inequitability of charging the gas consumers with the gas used for public purposes, perhaps our friends will tell us whether what the Corporation are doing in this respect is legal. By the 1886 Act, the Corporation are forbidden to make out of the gas undertaking a greater profit than the amount of annuities created for the purchase of the undertaking and 6 per cent. on the capital outlay of £128,910, on the capitalized profits of £75,436, and on the new capital to be raised under the Act. By taking free gas for public lighting, we claim, subject to the correction of disinterested legal authority, the Corporation are doing something that is in excess of the power given them by the 1886 Act. The value of the gas so wrongfully used in the past—if our interpretation is correct—amounts to many thousands of pounds. We are not arguing more for the out-townships than for the gas consumers of the borough. But if the authorities of the out-townships seriously contested this matter in the Law Courts, and it was proved that the Corporation had been acting illegally in regard to it, we

wonder what would be the position in respect of those many thousands of pounds' worth of gas the Corporation have taken over and above the amount of profit to which they are entitled by the Act of 1886. Perhaps the "Oldham Chronicle" will throw a little light on these questions, as we have failed to shake their opinion on the point of the inequity of the present practice, though it ought not to be possible to say in such a matter as this that there is equity in illegality—if so it be. We presume it was on the score of equity that Parliament in 1886 limited the "profits" to be taken by the Corporation.

A Big Gas Amalgamation.

An amalgamation of gas interests that will represent something gigantic in its kind at one move, is in a fair way of settlement in respect of the gas supply of the City of Buenos Ayres. The gas supply to the city has been a prosperous business, but not a peaceful one. Ever and again something is cropping up to disturb the minds of those who have the responsibility of the administration of these large concerns. For a number of months past, the Directors of the three Companies—the Primitiva, the River Plate, and the Buenos Ayres—have unitedly been negotiating with the Municipal Council over an unreasonable reduction in price that the latter wished to enforce on behalf of the consumers. The whole history of the affair, and its present position, is set forth in the speech of the Chairman (Mr. A. E. Bowen) at the meeting of the River Plate Gas Company last Friday. It presents a story of the disadvantageous circumstances under which—however liberal-minded Directors may be, and in fact are—the affairs of the gas supply in this distant city are administered through excessive zeal of the municipal authorities in making demands on these privately capitalized enterprises. There is competition between the Companies in the supply of gas; but competition in a commodity that requires such expensive plant for its distribution and sale does not really give to the consumers the same benefits as does free trading in other commodities. An unnecessary expenditure of capital for the purpose of conducting the competition annuls the supposed benefits of the free trade; while there are other ways and means—such as the sliding-scale system—whereby, without competition, consumers are ensured gas at the lowest price. There is no way in which the views of the municipal authority of Buenos Ayres as to price can be complied with, and at the same time give protection to the shareholders' interests, except by eliminating the competition from the gas supply, and bringing into operation the economies to be achieved by the three concerns being placed under one administration. Such a scheme is well on the road to consummation, if the shareholders of the Companies approve. With debentures there is an expended capital of not far short of four millions sterling involved in this amalgamation. Including £558,100 of debentures, the Primitiva Company have an issued capital of £1,757,800. Of this, £600,000 represents the purchase price of the assets and goodwill of the electricity section of the Company, instalments of which—amounting to £36,400—have been paid since the agreement for sale in 1903. Including £312,650 of debentures, the River Plate Company have a capital of £1,312,650; and including £250,000 of debentures, the Buenos Ayres (New) Gas Company have a capital of £950,000. These figures show that this amalgamation, if carried through, will be a big thing in the history of gas supply.

The Best Lighted Street in the City.

The deputation from the City Corporation have returned from their perambulation of Continental cities to learn of the systems in use for public lighting; and when their report is issued shortly, there should be in it, judging from what has fallen from the lips of Mr. Charles Alfred Teuten, much that is gratifying to the gas industry. Mr. Teuten, as Chairman of the Streets Committee of the City Corporation, headed the deputation; and, at the annual dinner of the Committee on Monday last week (as seen by a report in another column), he gave an indication of certain impressions. There is evidence that the Committee went on their visit with a single eye to the purpose of their mission. Their report will, it is anticipated, be a voluminous and instructive one, and will result in the adoption of an economical and efficient lighting system in the City. Among the notable remarks in Mr. Teuten's speech on Monday evening are these: "Looking through the City, Fleet Street is the best-lighted thoroughfare. . . . The authorities in Berlin have decided to spend 7 million marks, at the rate of 1 million marks per annum, on installing in all thoroughfares incandescent inverted gas-burners under pressure; and this decision has been arrived at after much investigation and experimenting by their Professor of Chemistry." Fleet Street—the best lighted thoroughfare in the City of London—is illuminated by high-pressure inverted gas-lamps.

Employers and Co-Partnership.

It seems probable that steps will be taken to bring to a head a suggestion made by Sir Christopher Furness, M.P., the other day that there should be a national conference of employers of the United Kingdom on the co-partnership question. A number of employers have expressed themselves in sympathy with the idea. There is no question that Sir Christopher's enthusiasm for co-partnership is unalloyed. He believes it stands at the very head of the means at hand to enable the industries of the country to confront their rivals abroad with a prospect of success; and he is disposed to urge that it should be brought into operation in every trade to which it can be made applicable. The co-partners would, be believes, perform their due share in the vitally important work of safeguarding and extending the gravely threatened position of England as the world's greatest industrial power. If Sir George Livesey were with us now, no two calls would be required to bring him to the forefront of a movement for the application to industry generally, or so far as they could be applied, of the principles of co-partnership. He held in his day that there could be no hope of any permanent peace in industry until there was mutuality of interest between employer and employed. He spoke of what he knew.

Saving Daylight.

The Daylight Saving Bill is securing a large amount of support. Resolutions in its favour have been passed by two County Councils, the Common Council of the City of London, the Convention of the Royal Burghs of Scotland (representing 199 towns), and upwards of a hundred Corporations and Town Councils of the British Isles; the whole representing a population of about 16 millions. There has also been a public meeting in support of the measure in the historic Guildhall of the City, when representatives of financial and commercial circles, and men of position and influence in other of the higher spheres, flocked round the Lord Mayor to show their sympathy with the movement and to help it forward. The principal speaker was Sir Robert Ball; and, according to him, there is really nothing the change will disturb that is of importance to the community. The theatrical folk think otherwise, and so do certain morning papers, who will lose first publication of some of the foreign telegrams. And there are people who supply the agents for artificial illumination who think it may affect their summer revenue. But the least to care about the matter are the gas people, whose day consumption in the summer time of late years has gone up considerably. Those who care most are the men in charge of electricity undertakings in residential areas. There are unkind folks who say that the less people have to do with things artificial the better; so perhaps it is wise to remain silent over the little loss that will be suffered by gas undertakings through the proposed curtailing of the hours of illumination by one per day in the summer. Human convenience must be studied. At the City meeting, it was resolved that the passing of the Bill would "improve the physical, mental, moral, and financial welfare of the nation," and so "is deserving of the support of all classes of the community." The Government were also asked to give facilities for the passing of the measure.

The salary of £250 offered by the Shipley Urban District Council, in the "JOURNAL" for the 6th inst., for the post of Engineer-Manager attracted 85 applications; and though the Gas Committee have reduced the number to eight, they are leaving the General Purposes Committee to make the appointment. It appears that when the Council acquired the gas-works, one of the conditions was that the Manager (Mr. T. G. Wilcock) should be retained at a salary of £400 per annum, and that in the event of his retirement he should have a pension of £150 a year. Owing to ill-health, he had to resign about a year ago, and since that time the management has devolved upon the works foreman—the Council thus saving £250 for the year. It has now been suggested that the Council should continue to effect this economy by keeping the appointment vacant, and letting things go on as at present. The suggestion evidently does not find favour with the Gas Committee.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 250.)

THE past week was not quite all that could be desired on the Stock Exchange; but considering the epoch-making events in course of enactment in the Near East—historically the danger quarter of Europe—the steadiness and self-control of the markets were highly gratifying. The cue was given from the start; for Monday opened with a demonstration of determined cheerfulness. The atmosphere had been to some extent cleared by the realizations the week before, which shunted weak operators out of the way. Thus many prices had a nice rise; Consols scoring $\frac{9}{16}$, and the Foreign Market showing strength. Tuesday started on the same line; but business fell very slack, and, after some hesitation, prices began to give way. Consols lost $\frac{3}{16}$, and other gilt-edged quotations were easier; but the Foreign Market stood steady. Wednesday was much firmer—taking a more hopeful view of the Turkish situation. The Foreign Market was strong, and Consols recovered. Business on Thursday was very quiet; and the general attitude was cautious and rather shy. The Foreign Market, however, showed no alarm. Railways were depressed at the sight of the tripartite working agreement being doomed. Things continued quiet on Friday; but they showed no sign of weakness till late in the day. Saturday opened in this mood, but improved again later on; so that at the close there was not much change on balance. In the Money Market there was an extremely abundant supply at increasingly easy rates, and discount quotations steadily relaxed. Business in the Gas Market was more active, quite regaining its normal level; and several quotations in the London market were advanced. In the Sheffield and Liverpool markets, the local undertakings had one issue each slightly lowered; but they could well bear it. In Gaslight and Coke, the ordinary was active and touched higher figures; transactions ranging from 103¼ to 104. The secured issues were quiet; the maximum realizing 88½ and 89, the preference 106½, and the debenture from 85 to 85½. South Metropolitan was more active than of late, and commanded prices ranging from 123¼ to 124—a rise of 1. The debenture fetched 85 and 85⅛. In Commercials, the 4 per cent. was done once at 107. Among the Suburban and Provincial group, Alliance and Dublin new changed hands at 12¼, Bournemouth "B" at 16¾, British at from 42 to 42½, Bromley "A" at 115½, Ilford "A" at 134½, and West Ham at 119⅝ and 120 (a rise of 1). In the Continental companies, Imperial was stronger at from 184 to 186 (a rise of ½), ditto debenture realized 95½, Union 101½, ditto preference from 139 to 140, European fully-paid 24¼ and 24$\frac{5}{16}$, and ditto part-paid from 17¾ to 18. Among the undertakings of the remoter world, Buenos Ayres changed hands at from 13⅛ to 13⅜ (a rise of ⅛), Oriental at 141½, Primitiva from 6½ to 7⅛ (a rise of ⅝), ditto preferred at 5⅛, ditto debenture at 96¾ and 97, and River Plate at from 14 to 14¼ (a rise of ½).

ELECTRICITY SUPPLY MEMORANDA.

A Fillip Required—Show-Rooms and their Attendants—Lethargy in the Gas Show-Room and its Dispersion—Difficulties of the Electrical Salesman—Heating and Cooking the Ways of Salvation.

THE electrical industry, we read in the "Electrician," is badly in need of a fillip at the present time; and our contemporary has been displaying much energy of late in trying to infuse a little more spirit into the commercial operations of electricity undertakings, and inculcate practices that are considered as founded on the right lines. The effort is praiseworthy; and it must be a matter of delight to the readers to observe the robust faith existing in the future of an industry that, after thirty years' labour in establishing itself, stands "badly in need of a fillip at the present time." Among the writings in recent issues of the "Electrician" bearing upon the subject is an account of visits paid by an electrical engineer to a number of show-rooms of both electricity and gas undertakings. He went in the guise of a good-natured person seeking information for a friend of his who happened to be thinking of taking a house in the neighbourhood, and who desired to get at the truth, before commencing to fit up the place, regarding the relative merits and demerits of gas and electricity. The ruse was thinly veiled; and probably some of the want of success of this delightful friend was due to the fact that the attendants were not dealing direct with the prospective customer himself. Nevertheless, the trick succeeded so far that the investigator obtained sufficient impressions to form a judgment on the subject in hand. On the whole, though prejudice here and there peeps out, he treats of his adventures fairly; and on the score of efficiency for the purpose, he certainly awards the palm to the show-rooms of the gas undertakings that he visited, and to their attendants.

The show-room men of the gas industry, however, must recognize that, just as gas has a competitor in electricity, they, too, have competitors in the electricity show-room attendants. They must therefore look to it that they maintain the reputation they have of being well-versed in their subject, and eager in the interests of those they serve. From the very cheapness of gas, its greater heating efficiency, and the cheapness and efficiency and low cost for maintenance of gas appliances compared with electrical appliances, they have advantage on their side. But the knowledge of this must not allow them to lapse into the dormancy oftentimes produced by a sense of security, as the inevitable consequence would be the loss of ground that might otherwise have been retained. In the gas show-rooms, the electrical visitor asserts that he at first found the attendants lethargic; and he cannot repress a little joke by remarking that he does not know whether this was due to the amount of gas being consumed for lighting and heating. He himself shows that it was not so; for a mere inquiry as to the relative costs of gas and electricity for different purposes roused the attendants to such cerebral activity that their interrogator has to admit they were well up in their subject on both this and the relative hygienic advantages of the two illuminants. The investigator regards this latter point as a vital matter for gas undertakings; and the statements of the gas show-room attendants he naturally pretends that he received with a grain of salt. In the gas show-rooms, there was no doubt a great deal more gas being burned for demonstrating lighting and heating than would be the case under normal conditions in a house, and yet it was an easy matter to rouse the attendants from the lethargy which he fancied possessed them on his first introduction. If he turns this matter over in his mind, and applies a little reasoning to his experiences, he must come to the conclusion that they show that the "lethargy" was not at all serious, and that there are exaggerated and unfounded notions in electrical circles on this "vital matter" for gas undertakings.

In the electricity show-rooms, the investigator does not appear to have found anything to his satisfaction. The attendants themselves did not appear to him to be up to their business; but he does not make sufficient allowance for the difficulties of the position of the electrical show-room man. The electrical show-room man who could answer all the questions of an inquirer to the satisfaction of the central station engineer should be one without any conscience, and one who has a sufficiently broad back to bear the after-reproaches of the deceived consumer. The electrical show-room attendant has to deal with an adverse condition of affairs, including complicated systems of charging and complicated apparatus, neither of which the public can take to kindly. The attendants themselves prove the difficulties of their situations by the narrowness of their knowledge. At most of the show-rooms, there was found an incapacity for explaining the systems of electricity charge lucidly and in language and terms that could be understood by the man in the street, and for describing the working and the efficiencies of the apparatus the use of which the attendants are there to advocate. They volunteered little information; and the only way that the inquirer could get particulars was by a process of catechism, and sometimes not then. He accuses these attendants of being a lot of pessimists. It may be suggested that perhaps the attendants are more particular about their hereafter than their masters. It is not a pleasant thing to tell a consumer that with electricity this and that piece of apparatus will work out cheaper in first cost and in use than gas, and that it will be more efficient and give less trouble than its equivalent among the means of using gas; and then to have the irate and deceived consumer returning after a period's experience, and telling the show-room attendant that his proper category is headed with a word containing only four letters. Deceived consumers can do as much mischief as the best of show-rooms can do good. We firmly believe that the mendacious literature and pictorial caricatures issued by electricity supply undertakings have done as much as anything to disgust householders, and to cause them to dismiss from consideration the question of a change from gas to electricity; their experience of gas being directly opposed to the printed assertions of the electricians. Our advice is to now try the effect of telling the truth, and hiding nothing. Perhaps, too, the show-room, forming a direct communication between the electricity station and the public, may be the means of inducing the electrical industry to try to replace complication by simplicity. This they could do in their charges; the greater difficulty is, of course, to simplify the fittings and apparatus.

It may be said in reply that the employment of truth by electricity show-room attendants, as found by the "Electrician" investigator, has not met with any great success in developing business. But if the attendant tells the truth in answer to direct questions, and gives evasive replies when he dare not give a direct one, and then the inquirer is supplied with literature that makes such bold assertions that light for light electricity is cheaper than gas, and that gas scatters sickness and death around by its poisonous qualities, confusion is produced in inexperienced minds, and a want of confidence in experienced ones. This is also bad for the business. This investigator did not inquire much into the question of lighting; but relative costs (on which he could get no satisfaction from the electricity show-room men) and heating and cooking were the subjects of most of his inquiries. Regarding heating and cooking, he found the attendants cautious; their arguments lukewarm. When he inquired as to heating appliances, he was told that a separate circuit would be required for the heating current, and that the electric radiator was no use for heating a large room. These are truths. Then why complain? The substantial first cost of electric cooking and heating appliances was also pointed out. Well, there is also truth in this. But it is called "crying stinking fish." Would the investigator have business obtained under false pretences? The "Electrician" thinks it in the highest degree unlikely that, until some uniform system of charging is introduced, electricity for heating and cooking can have any very general vogue, as the ordinary

consumer thinks twice before putting in a duplicate service, as he must at present do to obtain the reduced rates for these purposes. But our contemporary apparently overlooks the fact that a uniform rate could not be put (if at all in these times) much below lighting prices; and at the 1d. per unit rate, electricity is so inefficient as a heating agent as to be expensive in comparison with gaseous or solid fuel, upon which point Mr. Cyril Davis supplied some valuable information in a letter which appeared in our "Correspondence" columns last week.

Albeit our contemporary is of opinion that "electricity for heating and cooking will in time be generally employed;" and the peripatetic searcher into the usefulness of show-rooms and the ways of their attendants says: "That electricity for heating and cooking will in time be universally employed, no sane man can have any doubt; but how long before such a state of affairs will exist, depends not a little upon the efforts of those whose business it is to supply the necessary energy and the apparatus for these purposes." There is something else, and that is the finding of a way to get a greater proportion of the heat units of the fuel used under the steam-boilers at the generating-station represented at the points of heating and cooking use. It is not by any means altogether a question of the improvement and lowering in price of the apparatus; but the suggestion that these are the directions in which the electricians are looking for further rays of hope shows that heating and cooking apparatus are not yet perfect—failure is a common experience, inefficiency a constant one—nor that their cost is at anything like a popular level. We are not by any means disposed to agree as to electricity being the general and universal heating and cooking agent of the future, nor is Sir Oliver Lodge, nor are the public—judging from the rate at which gas cooking and heating stoves have been adopted during recent years, and which shows that they appeal to others besides "gas enthusiasts." The prospects for electric heating and cooking are not bright; and we cannot suppress the fear that the expressed belief of our contemporary and of the show-room visitor masquerading in an assumed character is but the reflection of a shadowy hope.

In another article, the "Electrician" carries the subject of heating and cooking further by advocating the hiring-out by electricity undertakers of the necessary apparatus. There are many undertakings where a motor load is unobtainable; and our contemporary points out the most obvious truth that their future welfare is largely bound up in the supply of electricity for all household purposes. "The greatest possibility" for these unfortunates "lies in the direction of the use of electricity for heating and cooking." The advice is given that much may be learned by a study of the methods of gas undertakings in hiring-out gas cookers and fires. Electricity undertakings have been reluctant to take up the letting on hire of electric cooking and heating apparatus; but our contemporary insists that some such arrangement is imperatively necessary. It is, however, all a question of Will it pay? We are as confident that it will not as our friends are that the hiring-out system is necessary. Under present circumstances, hiring-out must act as a drag on an undertaking rather than be a helper out of its troubles. In the first place, we have never yet seen any rational defence by our electrical friends of the charge of 1d. per unit for such a short-hour and intermittent and fluctuating load as cooking and heating. The 1d. per unit certainly cannot pay. Upon this there is the capital expenditure, repair, and wear and tear costs, which are all heavier for electrical cooking and heating apparatus than for that of the competing agent. Upon both of these sides of the question, the electricity supplier has to look in considering the hiring-out of such apparatus. It is a matter of business; and it is inexpedient to open up any branch that is going to create a loss. The Blackpool Corporation are going to try an experiment with a rental of 10 per cent. on the cost of heating and cooking apparatus and a charge of 1d. per unit for the electricity. It is admitted by our contemporary that 10 per cent. on cost as rental may prove insufficient to cover maintenance and depreciation for the time being. Besides this, it is understood the Corporation are employing their "reserve funds" to purchase the apparatus to be let on hire. Are these funds going to be replaced out of the 10 per cent. and the "profit" from the 1d. per unit electricity? We fear not. It is, in our opinion, an unsound financial policy upon which the Blackpool Corporation are embarking. Is the 10 per cent., too, to be spread over the cost of installation as well as that of the apparatus? Ten per cent. on an electrical cooker would be a heavy rental, without being extended to the cost of installation. But someone has to pay for this. Altogether, if heating and cooking offer the greatest possibility for electricity undertakings without a power load, then they deserve to be the objects of pity, with so much internal and external disadvantage against them.

Concrete-Covered Piles.—The piers on the San Francisco waterfront are partly carried on creosoted piles and partly on concrete covered timber piles. The latter type has proved a great improvement over the former; but, according to a recent report by Mr. Ralph Barker, an Assistant State Engineer, it has some defects. If there is no hard bottom within a reasonable depth, the pile has to carry the heavy weight of the concrete in addition to its proportion of the load of the pier; and, consequently, its efficiency as a pile is reduced by the concrete envelope. Where a hard stratum is reached, the concrete cylinder rests on this, and may render the timber pile superfluous.

PERSONAL.

Mr. WILLIAM R. GLOVER has been elected a Director of Messrs. Glover and Main, Limited, Messrs. Thomas Glover and Co., Limited, and Messrs. R. & A. Main, Limited.

The "Journal für Gasbeleuchtung" announces that the German Continental Gas Company have appointed Dr. L. LANG, who has hitherto been in charge of their works at Gotha, to be Manager of the Potsdam Gas-Works—in succession to Dr. G. Mohr, whose death is reported in to-day's obituary notices.

OBITUARY.

Much regret is felt at Fareham at the death of Mr. THOMAS HEWETT, who had recently retired from the chairmanship of the Fareham Gas Company after a quarter-of-a-century's service in that position. The deceased was in his 85th year.

We regret to hear of the death, on the 14th inst., of Dr. G. MOHR, the Manager of the Potsdam works of the German Continental Gas Company. He had been in the service of the Company for thirty-six years, during the last twenty of which he had been in charge of the Potsdam station. He was about to retire from work—having reached his seventieth year, but failed to recover from a long illness. Deceased was well known among his professional colleagues for his activity in connection with the "Berufsgenossenschaft" or professional union of gas and water works, of which body he was President.

The death occurred on Saturday, the 17th inst., after five weeks' illness, of Mr. GEORGE CROWE, the Engineer of the Chester Water Company. Deceased was a native of the city, having been born there in December, 1844. His father was an engineer in the firm of Messrs. Peto, Brassey, and Betts; and the son was in their service when the business had been reconstituted as Messrs. Peto, Betts, and Crampton. After having had varied experience in connection with engineering, he returned to Chester, and obtained an appointment with the Water Company as a mechanical engineer. This he held till the death of Mr. Dugdale, the Chief Engineer, in 1891, when he was promoted to the position, which he filled with the greatest credit. At his suggestion, and under his supervision, the Company's system of filtration was changed, and his method of graded sand filtration was introduced with the utmost benefit. He was of an inventive turn of mind, and among other patents taken out by him was one for a water-meter. The funeral, which took place at Chester Cemetery last Tuesday, was largely attended. Mr. Crowe leaves a widow and two sons.

THE LIVESEY MEMORIAL FUND.

WE have received from Mr. Walter T. Dunn the following list of further contributions to the fund:—

1909.		£	s.	d.
April 19	Previously acknowledged	9120	1	1
23	John R. Heath, Stoke-on-Trent . .	2	2	0
	Leslie E. Clift, Chairman of the Redditch Gas Company	3	3	0
	Redditch Gas Company.	21	0	0
26	Aberystwyth Gas Company . . .	5	0	0
	Total	£9151	6	1

THE BUILDING TRADES EXHIBITION.

AMONG the trade exhibitions which are held periodically, one of the most popular is certainly that connected with building, which (under the organization of Mr. H. G. Montgomery, M.P.) takes place biennially at Olympia. For the fortnight ending next Saturday, every available foot of space in this enormous hall is crammed with objects of interest to those who erect buildings and those who have to use them. Not everything that is utilized in the building industry is represented; but most things must be—more or less—among the hundreds of exhibits. A thorough inspection of all that is to be seen involves a walk of several miles; but the excellent arrangement of the stalls enables the task to be accomplished, catalogue in hand, without any of the retracing of steps and random search for descriptive matter which is so trying to the patience of the conscientious visitor. A trade exhibition is of necessity very largely "fashionable;" and in this case several questions that have lately been to the front receive due emphasis. For instance, the efforts that have been made to remedy the dust nuisance are demonstrated in an excellent show of tar-spraying appliances and special compositions; while there is also a good display of coke and other stoves for use in connection with hot-water circulating systems. Other examples there no doubt are in plenty; but these are the two which struck the writer while engaged in a search for any exhibits that might have a direct bearing on the gas industry.

To come to the point of the article, it may be remarked at once that this search was not very productive; but at the same time gas is not entirely unrepresented. Indeed, there is provided at the stand of Messrs. Davis, Bennett, and Co. a thoroughly up-to-

date exhibition of lighting, in the shape of an installation of Keith high-pressure inverted gas-lamps (giving 60-candle power per cubic foot of gas consumed), of the kind which have lately proved so successful in the lighting of Fleet Street. The exhibit of Messrs. Davis, Bennett, and Co. includes a model kitchen, in which is to be seen a gas-cooker fitted with Serne's patent hot-closet, manufactured by the Davis Gas-Stove Company, and which is supplied on hire by the Gaslight and Coke Company. This hot-closet, which is fitted above the cooker, is intended to keep plates, dishes, puddings, &c., warm by utilizing the waste heat from the oven and hot-plate burners. The waste heat from the oven is conveyed to the hot-closet by means of a special pipe fixed at the back of the cooker, and passes off through an outlet on top of the closet. When neither the oven nor the hot-plate is in use, and the closet is required for warming purposes, it can be heated by a small atmospheric burner (which can be swung back when not needed) fitted immediately under the closet. The space between the bottom of the closet and the hot plate is 18 inches, which gives ample room for the use of large utensils; and it is made in two stock sizes, 24 and 30 inches wide outside respectively. There is also a Fletcher-Russell water-heating apparatus, fitted with patent thermostatic valve, and capable of supplying 400 gallons of hot water per day. This can be fitted to an existing system of pipes, so that either coal or gas may be used as required.

Gas is also represented at the stand of Mr. Thomas Potterton, who, in addition to the Davis steamless radiator and other appliances, makes a special show of the "Queen" combined coal or gas burning range and the "Victor" gas-boiler. The "Queen" range can be instantly converted from a coal-burning to a gas-heated cooking-stove, or *vice versâ*, each presenting all modern details for efficient results. A special feature is made of the fact that the water heating is provided for by two distinct boilers—one for the coal-fire, and the other for the gas. A high-pressure boiler is fixed at the back of the fire to supply the hot water when coal is being used; while for the gas there is a "Victor" boiler combined in the range. The pipes from both boilers are joined above the hot-plate, so that the supply of hot water to the tank and taps is regular, whichever boiler is used. When gas is used for the oven, the necessary ventilation is automatically provided when turning on the gas-taps. The ventilating openings cannot be closed while the gas is on, as the shutting of one turns off the other. When coal is being burnt, the gas tables are lifted; but though they are hinged at one side, the gas service has no hinged or working joints in it. The range, which is portable, is made in three sizes. As to the "Victor" gas-boiler, this is an already well-known and well-tried appliance; and its uses include the supply of hot water and the warming of rooms or greenhouses by hot-water pipes or radiators. Among the large installations now in use, it may be mentioned that at Sandow's Institute of Physical Culture in St. James's Street, eight of the boilers were fitted up in 1907, and have since continuously supplied from 200 to 250 hot baths per day; while a further installation of sixteen boilers, to supply another 450 baths daily, is now being carried out. The cost per bath for gas is stated to work out at something like 1d.; and, as will be imagined from the fact that the further installation is being put in, the boilers have given entire satisfaction.

The Aerograph Company show their spray-painting apparatus, which, in the larger sizes, is particularly suitable for gasholders and other big surfaces; and Messrs. Williamson, Cliff, Limited (to whose works reference is made in the report of the meeting of the Eastern Counties Gas Managers' Association, in another part of this issue), exhibit their fire bricks and blocks. The "Gem" cast-iron multitubular gas-boiler (fitted with vertical steel tubes), which is made in two sizes, is to be seen at the stall of Messrs. Hartley and Sugden, Limited; while Messrs. James Stott and Co. make a working display of their gas-governors, and also show their instantaneous water-heaters. A large number of geysers are to be inspected at the stand of Messrs. Fenlon and Son; and Messrs. Ellkay and Co. have on view their "Perfect" fire or gas wash-copper. There is a numerous show of air-gas plants; while the use of gas for power purposes is represented by Messrs. Richard Hornsby and Sons, who exhibit a "Hornsby-Stockport" gas-engine, to give 17 B.H.P. with suction gas, or 21 B.H.P. with town gas. "Ye Olde Yule Log" gas-fires are shown by the London Warming and Ventilating Company; and at the stand of the Webb Lamp Company are to be seen the Company's various ventilating appliances and other specialities. A display which deserves special mention is that of the Birmingham Guild of Handicraft, Limited, which embraces a beautiful selection of gas and electric fittings. Messrs. John Barker and Co. again invite attention to the Kennedy tube bending machine.

An extensive show of gas and water works appliances is made by Messrs. J. Blakeborough and Sons—among other things being Boyd's drilling and tapping apparatus for inserting ferrules in water-mains under pressure. With this appliance, it is stated, a main can be drilled and tapped, and a ¾-inch ferrule inserted, in less than ten minutes. Among its advantages are placed simplicity in operation and lightness. Messrs. Ham, Baker, and Co. show the Ham apparatus for drilling and tapping water-mains under pressure, without loss of water, with which it is also stated that a 6-inch main can be drilled and tapped, and the ferrule inserted, within ten minutes. The advantages claimed for the appliance are that it is strong, portable, quick, and does good work. Other exhibits of special interest to the water engineer are Callender's water-tight bitumen sheeting, plans and drawings of the Candy filter, and Boby's "Simplex" water softener.

NOTES FROM WESTMINSTER.

PARLIAMENTARY business was resumed last week, after the brief respite afforded by Easter; but there was no disposition to get to work with any rush. The Gaslight and Coke Bill is still hung up in connection with the blocking movement of Mr. Will Thorne. It is now expected to come before the House this evening for third reading, and then Mr. Thorne will move that it be read——according to the old formal manner of gently disposing of a measure—"this day six months." As we have said before, it is not at all likely Mr. Thorne will have the sympathy of the House with him in view of the passing of the measure by the Select Committee to whom it was referred, and of the part that the West Ham Corporation took in the settlement before the Committee. In recent sessions, too, Parliament have shown—excepting in the one case of the Irish scheme for generating electricity by peat gas—notably in the cases of the East Hull and Worthing Gas Bills, a disinclination to interfere with decisions of Select Committees. On Thursday and Friday, the Yorktown and Blackwater Gas and Electricity Bill was before Mr. Rose's Committee; and possibly early this week, the decision will be given. It depends largely on this decision whether it will be necessary to trouble the Committee with the Aldershot Gas and Water Company's Bill, or at all events to a very small extent, because, as a matter of fact, there seems to have been practically, if not entirely, a complete wiping away of the original opposition to the measure—the chief outstanding dispute being the one with the Yorktown Company as to the supply of gas for use at the Government Military Staff College. Practically, on this point, the two Bills are simultaneously before the Committee. However, at the time of writing, it is too soon to speak precisely as to what will happen in regard to the matter. The clearing away of so much opposition from both the Aldershot and Yorktown Bills is a matter of some surprise; but it is decidedly complimentary to the Companies and to their advisers. Amicable arrangement of differences outside the Committee rooms is doing more this session to speed the progress of Bills than fighting within the rooms. The parliamentary papers are constantly noting the withdrawal of petitions.

The Oldham Corporation Bill has again been before the Local Legislation Committee; and the water section has been partially passed on certain conditions. The gas section will probably be under consideration this week; and we shall be looking for interest on the matter of the appropriation of profits and the free supply of gas for street lighting. The amount of profit Oldham may take in aid of the rates is limited by their 1886 Act; but they appear to supplement their power by making the undertaking supply gas free for public use. This requires looking into. The question of the limitation of the profits to be taken from the Gas Department is also coming forward we believe in connection with the Salford Corporation Bill. It will be peculiarly interesting to hear the case that is made out—in these times of the municipal ownership of electricity undertakings, and the increasing use of gas by the poor—in defence of the practice of taking so much from gas in relief of the rates, and so little from electricity, when, if ever, any profit is made. New regulations in the changed circumstances require to be applied to the conduct of municipal trading. The Chairman of the Gas Committee of the Manchester Corporation—who is always attacking the system that allows £50,000 or more per annum to be taken from the gas consumers of the city, and to be used largely in reducing the rates of the electricity consumers—will watch with special interest the attack made on the unlimited profit-in-aid-of-the-rates system in connection with the neighbouring borough of Salford. The water section of the Cardiff Corporation Bill has been before Committee, but has not yet arrived at any definite stage.

A Territorial Question. Territorial questions have been fairly frequently raised in the Committee rooms in various forms during recent sessions; and it was a question of a small area, but an area not to be despised, that really brought the Yorktown and Blackwater Gas Company's Bill before Mr. Rose's Committee. The Aldershot Gas and Water Company were there disputing any right on the part of the Yorktown Company to be placed in full possession of the coveted ground. The Easthampstead Rural District Council were also present objecting to electricity powers being given to the Company. There was a strong representation of Counsel for the two principal parties; and the Yorktown Company had as their gas experts Mr. E. H. Stevenson and Mr. Arthur Valon. The Chairman of the Company (Mr. A. H. Claypole, J.P.), the Engineer and Manager (Mr. John Meiklejohn), and the Secretary (Mr. S. Rowe) were also watching and helping. Mr. Charles Hunt was there looking after the interests of the Aldershot Company. Mr. A. F. Wilson, the Chairman of the Company, and Mr. R. W. Edwards, the General Manager and Secretary, were also in attendance. A big survey was made in the evidence of matters that went beyond the points upon which the judgment of the Committee was desired. Respecting the latter, the simple facts were: The promoters want to extend their limits of supply, and in doing so to repeal certain unexercised powers of supply of the Aldershot Company. On a part of this land where the pipes of the Aldershot Company have not been carried stands the Staff College of the War Office, which is an important consumer of gas. At one time, however, the War Office made their own gas at Sandhurst; and then they discontinued doing so, and threw the supply open to tender. The contract was secured by the

Yorktown Company; and for seven years they have been supplying in bulk into the War Office holder at Sandhurst, which is now within the Company's district of supply, and from the holder the War Office has taken the gas to the Staff College, which is within the area of the Aldershot Company. Of course, the cessation of gas manufacture by the War Office altered the condition of affairs; but the Yorktown Company got the contract to supply in bulk, and they would now feel the loss of the business. The Aldershot Company are of opinion that their neighbours are acting *ultra vires;* and there is an action pending in regard to the matter. The Yorktown Company by their Bill are virtually seeking protection for the existing conditions, and asking for the transfer of powers possessed by Aldershot, but, through not being exercised, never enjoyed. In the Draycott and other cases, Parliament has shown little sympathy with companies holding unexercised powers; and at the time of writing, it certainly looks as though the Yorktown Bill will make an addition to the precedents in this respect. The object of the Easthampstead District Council in opposing was to protect the gas consumers in their district. They fear there may be loss on the electricity supply, and that the gas consumers will suffer in consequence. The promoters frankly admitted that there might be a loss on the electricity business for a time, but contended that an electricity concern could be worked more economically in conjunction with a gas undertaking than in a state of separate existence.

Oldham Water—Costs against Corporation. There has been a tremendous fight over the water part of the Oldham Corporation Bill; and it only ended last Thursday. It has been, for several days prior to and since Easter, before the section of the Local Legislation Committee presided over by Sir F. Leyland Barratt. A rare representation of Counsel and eminent experts has been engaged both in favour and against the projects for an additional water supply for this great manufacturing centre. The constituent elements of the scheme were described when the provisions of the Bill of the Corporation were under review in our columns. The two principal features were the extraction of a good quality of water from the Butterworth Hall Colliery, and a pumping scheme at Delph and Linfitts. The latter had to take the brunt of the assaults of the attacking party, which comprised public authorities and millowners. There were a great number of matters raised bearing more or less directly upon the schemes before the Committee; but excepting to those directly concerned, there is not any particular interest attaching to them. The Committee gave most careful consideration to the whole question; but the upshot was that they only granted the Butterworth Hall project, and showed their sympathy with the millowners and other representatives of local interests opposing the Delph and Linfitts portions of the scheme. The Committee were quite persuaded that the pumping-stations at these places would have "a dangerous and deleterious effect upon the industries of the district." The Corporation, moreover, stand convicted of having put the millowners to unreasonable and vexatious expense in defending their interests and in resisting the proposals of the promoters. The Committee, so believing, exercised the power they possess, and put upon the Corporation the costs of the millowners' opposition. It is quite clear that someone has bungled over this matter. It is not often that a Committee go to such a length as this; and what the Committee thought on this occasion is to those familiar with procedure in the Committee rooms somewhat emphatically expressed in their act.

The Electricity Supply Committee of the Marylebone Borough Council recommend the appointment of Mr. A. H. Seabrook, M.I.E.E., as Engineer and Manager of the local electrical enterprise. There were 128 applicants for the office. Mr. Seabrook is at the present time Engineer and Manager of the West Ham municipal electricity undertaking, and he formerly filled the positions of Assistant Electrical Engineer at Hampstead and Great Yarmouth.

At the annual meeting of the Iron and Steel Institute, to be held in London on the 13th and 14th prox., the following will be among the papers submitted for consideration: "On the Preservation of Iron and Steel," by Mr. A. S. Cushman; "On the Rusting of Iron and Modern Methods for its Prevention," by Professor W. H. Walker; "On the Value of Physical Tests in the Selection and Testing of Protective Coatings for Iron and Steel," by Mr. J. Cruickshank Smith; "On the Manufacture of Peat Fuel," by Dr. M. Ekenberg; and "On a Comparison of the Methods of Determining the Hardness of Iron and Steel," by Professor T. Turner.

The waterproofing qualities of clay and alum when mixed with concrete were tested recently by the Maintenance Department of the Delaware and Ulster Railroad Company. In the clay tests, the cement was first mixed with clay in proportions of one part of clay to seven parts of cement, and the mixture then used as the cement in a 1:3 sand mortar. Blocks of this mortar over 8 inches thick were impermeable. Specimens 6 inches thick containing the same materials, but mixed with a 5 per cent. alum solution, were also impermeable when subjected to 40 lbs. water pressure. Other investigations were made on the effect of clay on tensile strength. The 1:7 mixture increased the strength; while 22½ per cent. of clay, a 2:7 mixture, and any alum tended to decrease it.

GAS AND ELECTRICITY IN SOUTH AFRICA.

Mr. Henry Hack's Impressions.

It may be remembered that in the "Journal" for the 29th of December last it was announced that Mr. Henry Hack, who a few months previously had retired from the position of Chief Gas Engineer of the Birmingham Corporation, purposed leaving England for a three months' tour in South Africa. He has now returned, and is so greatly benefited by the sea voyages, the sunny climate visited, and the change of scene that for the present he intends to remain at Langley Gorse, Sutton Coldfield. When advising us of his safe arrival home, Mr. Hack sent the following observations on gas and electricity at the Cape.

A Cordial Welcome to the Cape.

Although gas-works were generally "conspicuous by their absence" in the chief towns of South Africa which I visited, I should like to make a few remarks relating to the Cape Town and District Gas Company. Mr. E. P. Reilly, the Engineer and General Manager of the Company, having learned from the "Journal" that I was about to visit South Africa, looked for a time for my name among the advertised list of "arrivals" from England; and two days after I landed I was agreeably surprised to get a message from him on the 'phone at my hotel in Cape Town, welcoming me, and wishing to make an early call on me. This was promptly arranged. I do not remember having met Mr. Reilly before he went to the Cape; but I soon found in him a genial and welcome *confrère*, and gladly accepted his kind offer to take me about in his carriage, assist me in seeing the sights of Cape Town and the beauties of the various suburbs, and accompany me on a visit to the gas-works. I feel that I am very greatly indebted to him, busy man as he is, for devoting so much time and hospitality to me. A short description of the works will prove of interest to those of your readers who may not have previously had particulars relating to them.

The Old and New Gas-Works.

The original works at Cape Town are situated about half way between the docks and the town, on the principal road from the former; but they are not at present used for gas making—the Company being able to produce more gas, at less cost, at their Woodstock works, about 2¼ miles distant. At the Cape Town works there are seven beds of seven single retorts; the place being very much cramped. There are two holders of small capacity, one of which, at the time of my visit, was being re-crowned, and undergoing a general overhaul, entirely by the Company's own workmen. Gas, which is now made at Woodstock, is delivered into the Cape Town holders by two of Waller's exhausters, through a 16-inch and a 9-inch main; the latter being more of a reserve pipe. At Woodstock, where the works are not so cramped, there is a fine open purifying-house, containing six boxes, each 20 feet square, all on the "Green" cover system, an oxide floor above and a revivifying-floor below, with an electric hoist for filling the purifiers. The connecting-pipes lead up to rack-and-pinion valves, instead of an ordinary centre-valve, for, in their case, easier manipulation of gas from box to box. At these works there is a Dellwik-Fleischer "blue" water-gas plant, which is said to be working now very satisfactorily. At the time of my visit, a further four beds of through retorts, eight in a setting, were in progress; and I was told that, owing principally to labour not being of sufficiently intelligent kind for regenerative firing, the Engineer keeps to direct firing, rather than adopt the more scientific methods of heating by means of generators and recuperators so largely in vogue in modern gas-works. The results obtained are, however, in my opinion, good, considering that the coals come from England and have to cross the Equator, where Mr. Reilly suggests some of the gases from them pass out into mid-ocean through the ventilating-pipes in the ships. The usual production is 10,500 cubic feet of gas per ton, and including water gas it works out at something over 11,800 cubic feet.

The works are capable of producing about a million cubic feet of gas per day. Last year they made a total of 151,212,000 cubic feet, of which 22,984,000 cubic feet were from the Dellwik plant. The quantity of coal carbonized was 12,765 tons. It comes mainly from Northumberland, and, as may be imagined, costs a high figure when landed into the works. The retorts are drawn and charged (scoop charging) by Kaffirs, employed in gangs of three, as usual. They were a tall and fine set of men, and performed the operations quickly and well. They are paid 7s. 6d. each per shift, and labourers (Kaffirs) 4s. 6d. per day. A good mechanic or fitter earns on an average 12s. per day. With the exception of coke and tar, the residuals are useless. The Government bringing in guano bark kills sulphate of ammonia; and the cyanogen compounds in the gas are much too small in quantity to justify the erection of plant for their extraction and subsequent manipulation.

The plant at Woodstock is all comparatively new; and I noticed that a large battery condenser, of more than 200 square feet capacity, had been made on the works from an old gasholder. This I thought indicated no little ingenuity and forethought. Coals arrive in Clan Line steamers, and are then carted by road or rail into the works, where gangs of "boys"—*i.e.*, coloured men of any age from twenty to sixty years—unload the vehicles

straight into the store. Most of these "boys" were of a good, strong, well-formed type, with plenty of bone and muscle. I may remark here that, as regards conduct of works and maintenance, the engineer of a South African gas-works labours under adverse conditions compared with one at home. So long as things go well, he bustles along; but as soon as a stoppage or accident occurs, he is often "up a tree," because he cannot readily purchase a valve or special pipe connection of any kind, through being so far away from contractors or from another gas-works from which to borrow what may be required. Invention, of which necessity is said to be mother, then comes into play. The nearest gas-works to Cape Town are those at Port Elizabeth, 800 miles off—four days' journey by rail, and boats only calling from there once a week.

Features of Distribution.

The districts served by the Cape Town Gas Company cover a very great area—the two ends of the distributing mains being 13 miles apart; while the places supplied between these two ends include eight different municipalities and a road authority called the Cape Divisional Council. I learned that the Gas Company are on exceptionally good terms with all these local authorities. This cannot, perhaps, be always said as regards the old country. A mountainous district called the "Kloof" is supplied from the Cape Town holders, and some idea of the ascents may be gained from the fact that with a governor there set at 22-10ths on the sea level, the pressure increases to as much as 45-10ths to 48-10ths in the Kloof. Temperature plays an important part at midday; for about Christmas time the sun is "blazing" hot, rendering it impossible to keep one's hands on the holders for any length of time. In December last, the temperature recorded there was 168° Fahr., while in the evening it was down to 48°! The Sea Point district is lit with incandescent gas-lamps. Here, again, great variation of pressure occurs, though the district is divided into two portions—Green and Sea Point and High Level respectively; the latter being on the slopes of the famous "Lion's Head" and Signal Hill, and several streets reaching up to this summit. The pressure on the sea level being 4½ inches from the works, is greatly increased when supplying the high levels.

Quality of the Gas.

The Cape Town Company have always been in the happy position of which Sir George Livesey was of late years so strong an advocate—they have enjoyed a "leave alone" policy. Their business is not regulated by any Act of Parliament, there are no restrictions with regard to sulphur compounds or any other impurities, or to pressures, candle power, or price, as to all of which the Company are left to act according to their own judgment as to what is desirable to secure a demand for their commodity. I noticed by the test-papers in the laboratory (records extending over long periods) that the gas sent out was free from sulphuretted hydrogen; and its illuminating power was stated to be about 14 to 15 candles. The light from the incandescent burners and generally was, in my opinion, most satisfactory; the candle power being, in fact, that which the coal would be expected to produce, the yield per ton being taken into account. Shop lighting by gas is said to be making good headway; but as every shop closes at 8 p.m., it has not yet come to be what one might call a brisk business.

The Company's Business Methods.

The pushing methods adopted by the Company were very apparent, for the very latest gas appliances are in stock at their show-rooms; and in the Mowbray district, one can see a fine specimen of high-pressure street lighting—certainly as good as one is accustomed to see in England. Mr. Reilly suggests that the reason for this is that the Mowbray Council pay for good light; and they get it. Within the past ten years, the Company appear to have had both "ups" and "downs." They introduced slot-meters in 1901, and now they can count users of these meters by the thousand. But the quantity of gas consumed per meter has, owing to depression in trade, become less, notwithstanding that the Company boom cooking and heating by gas, going so far as to adopt the practice in England of having the "lady demonstrator."

Just now, not only Cape Town and its suburbs but the whole of South Africa is in a state of abnormal depression. "Union" and "Federation" are largely talked of; and if either of these is definitely settled upon, South Africa should prosper more than ever it has done, and the gas industry again flourish, alongside of the supply of electricity, and result in a return to the payment of dividends by the Company. I was glad to learn from Mr. Reilly that he thought considerable improvement would be shown in the results by the Directors' report for last year, particulars for which he had already forwarded to them. I hope his Directors may see their way to consider a suggestion that I am going to make. Although generally a man of robust health, Mr. Reilly has had several drawbacks to it, by family losses, and more recently by the after poisonous effects of a blow he received from a native, with whom he had to severely deal for an unpardonable offence while at the gas-works.

The Company's Competitor.

The Municipality of Cape Town own the electric tramways, and have set up a large and up-to-date electrical station from which they supply current for electric lighting, which I learnt was being pushed, and was going ahead—a powerful competitor of the Gas Company in the town area. Judging from this and the general appreciation of the South Africans for electric lighting, as is evidenced by this kind of illumination being in vogue exclusively in many of the large towns which I visited (but I may be wrong), I think the future profits of the Company will result mainly from the supply of gas to the important suburbs, with the supply of electricity in the hands of the Municipality; for much increase in the demand for gas in the town is hardly likely.

Harmonious Working among the Officials.

Mr. Reilly introduced me to Mr. Gallagan, the Company's local Secretary, with whom I was very pleased to learn he worked most harmoniously; no friction or worry having at any time arisen in connection with their respective duties. Mr. Reilly also introduced me to the local Director, Mr. A. C. F. Gore, from whom I received great kindness and hospitality, and with whom I spent a pleasant hour or two. In the course of conversation, I happened to touch upon some matters of plant at the works. He promptly explained that his duties were only and entirely of an advisory character, being limited to matters of "policy," upon which he and Mr. Reilly consulted together as occasion required. In all other respects, he said, Mr. Reilly had quite a free hand; and his advice on engineering and the management of the works the Directors always accepted and solely relied upon. During our several days' interview, it was observable that Mr. Reilly had kept himself quite *au courant* with all matters "gasical" which he could obtain from the "Journal" and other technical sources. Still I sympathized with his wish that the Company should desire him to have a long holiday for a visit to England, and perhaps the Continent, every three or four years, to see for himself new and up-to-date gas installations and practice, and rub up against members of his profession. Opportunities for doing this are afforded by attending the meetings of the Institution of Gas Engineers. I intend these remarks to apply to all chiefs engaged at foreign gas undertakings.

A Town without a Gas Supply.

Among the places lighted entirely by electricity, I would particularly name Durban, Natal, a modern, clean and beautiful town, which I greatly admired. It has a native population of about 20,000, and 35,000 Europeans. It was the best example of electric lighting that came under my notice. I could scarcely credit that so large a place had no gas supply whatever. Through the kindness of Mr. Fletcher, formerly of Sutton Coldfield, the City Engineer and Surveyor, upon whom I naturally called, I was introduced to the ex-Mayor, Mr. Ellis Browne (he was Mayor at the time of Mr. Chamberlain's visit), who kindly drove me in his motor-car through the best parts of the town and suburbs. While with him, I touched upon the admirable lighting of the town and the absence of gas; asking him if he did not think that the inhabitants would appreciate a gas supply for heating, cooking, and power, even apart from lighting. His reply was: "Well, I have thought a good deal about the matter; but I can learn of no general desire for such a supply, and the Corporation are not likely to incur the cost of giving it by an undertaking put up out of the rates, in face of the great expenditure already incurred upon electric lighting, and they would certainly not grant a monopoly of a supply to a private company or firm. Moreover, the climate here is so different from that of England that the demand for gas for heating purposes would be insignificant." The charge for electricity is 8d. per unit to ordinary consumers, less 10 per cent. for monthly payments. Large supplies are given at a reduction; while the prices for special supplies to works, factories, &c., are all dealt with separately, according to circumstances.

Reverting to the Cape Company, I should state that the price of gas to ordinary consumers is 9s. per 1000 cubic feet, with 5 per cent. discount if paid within thirty days. This price has been reduced, for power only, as follows:—

Small quantities	7s. 6d. per 1000 cubic feet.
10,000 cubic feet and upwards, monthly,	7s. 6d. per 1000, less 10 per cent.
20,000 " " " " "	7s. 6d. " " " 15 "
30,000 " " " " "	7s. 6d. " " " 20 "
50,000 " " " " "	7s. 6d. " " " 25 "

If payment is not made by the date specified on the invoice, the ordinary lighting rate of 9s. per 1000 cubic feet has to be paid.

A Closing Tribute to Mr. Reilly.

I would conclude these notes by a further reference to Mr. Reilly's attention to me. Not resting satisfied with what he had already done for me, he met me on the day of my leaving for England, to bid me a hearty "Good-Bye" and "Bon Voyage;" and I therefore suggest that if any other gas man of position goes to Cape Town, he should remember that there is there a Mr. E. P. Reilly, and "make for him."

Association of Gas and Water Engineers of Austria-Hungary.—The last number to hand of the "Zeitschrift des Vereines der Gas und Wasserfachmänner in Oesterreich-Ungarn" contains a provisional announcement of the twenty-eighth annual general meeting of this Association. It will be held at Grätz from the 20th to the 23rd prox., under the presidency of Herr Josef Anzböck, Chief Inspector to the Imperial Continental Gas Association in Vienna. It is announced that a number of interesting papers have already been arranged for. The detailed programme will be published later.

THE CALORIFIC VALUE OF MIXED COAL AND WATER GAS.

By Arthur Edgcome Brown.

In a letter to the "Journal" for April 6, the writer pointed out that as long ago as 1906 a standard of calorific power was fixed by agreement for gas supplied by the Tottenham and Edmonton Gas Company. It is not necessary to give here the history of the negotiations which were entered into at the time of the passing through Parliament of the Company's Act, 1906. Suffice it to say that the illuminating power standard was reduced from 15 candles in the No. 1 "London" argand to 14 candles in the Carpenter burner; the sulphur restrictions, which had been the source of much trouble, were removed; and, finally, a calorific standard of 450 B.Th.U. net per cubic foot was fixed, with a penalty for non-compliance. As already stated, the last proviso was not inserted in the Act, but in an agreement.

It is well known that the Tottenham gas contains a large proportion of water gas. The results of the official tests for the last three years are, therefore, of considerable interest at the present time. The tests for calorific value were at first carried out with the Boys instrument at the gas-works—some three miles from the official testing-station. Subsequently a change was made to the Junkers calorimeter. Since when all tests have been performed at the latter place; the illuminating and calorific values being directly comparable, which was not the case under the first arrangement.

Table I. shows the values obtained during the first period.

Table I.

—	Illuminating Power. "Metropolitan" Argand No. 2.			Net Calorific Power. B.Th.U. per Cubic Foot.		
	Max.	Min.	Aver.	Max.	Min.	Aver.
4th quarter, 1906 .	15·54	14·52	15·12	528	484	500
1st ,, 1907 .	15·81	14·50	15·09	515	487	499
2nd ,, ,, .	16·27	14·90	15·54	506	481	492
3rd ,, ,, .	15·50	14·61	14·99	491	470	484
4th ,, ,, .	16·12	14·34	15·23	502	469	490

Table II. gives similar figures for the second period.

Table II.

—	Illuminating Power. "Metropolitan" Argand No. 2.			Net Calorific Power. B.Th.U. per Cubic Foot.		
	Max.	Min.	Aver.	Max.	Min.	Aver.
1st quarter, 1908 .	16·05	15·11	15·53	505	470	488
2nd ,, ,, .	15·91	14·51	15·28	506	477	490
3rd ,, ,, .	16·28	14·57	15·42	496	465	487
4th ,, ,, .	16·20	15·20	15·62	501	477	490
1st ,, 1909 .	15·85	14·37	15·18	506	473	485

While, generally speaking, the two values rise and fall together, it is nevertheless possible with mixed gas to have considerable variations from this rule, as may be clearly seen from Table III., which exhibits the results of a few tests selected from the period corresponding with Table II.

Table III.

Illuminating Power.	Net Calorific Power.	Illuminating Power.	Net Calorific Power.
16·16	500	15·55	481
15·20	501	14·51	482
15·45	491	15·21	477
14·57	489	14·37	475

From a general survey of the above-quoted figures, it appears:

1—That the calorific value varied between 528 and 465 B.Th.U. (133·1 and 117·2 calories) net; the illuminating power lying between 16·28 and 14·34 candles.

2—That compliance with a standard of 125 calories net per cubic foot is not to be expected from a mixed 14-candle power gas, even when kept considerably above the statutory limit; but that a standard of 112½ calories net per cubic foot is, under present working conditions, quite capable of being maintained.

3—Finally, if in the perhaps not far-distant future illuminating power standards become obsolete, considerable difference of opinion is sure to arise as to the calorific standard which ought justly and fairly to be set up in each individual case. Seeing, however, that heat, and not luminosity in a given burner (never used by the public), is the all-important factor in present-day lighting, it is eminently desirable that the change should be speedily made; for existing statutory enactments cannot, in face of the varying composition of the gas supplied, secure that same uniformity in calorific value which they have of late years sought to establish in illuminating power.

UTILIZATION OF TAR AS FUEL.

The current number of "Le Gaz" contains the specification of a French patent taken out by M. Ramon Garzon, for a process for treating coal tar so as to allow of its utilization as fuel. It consists in the combination of a heated vessel, wherein the tar acquires the requisite fluidity to allow of its atomization, with a compressed air chamber in which this operation is performed. By means of a second atomizer, a certain quantity of water is conveyed to the mouth of the tar-sprayer, which makes it possible to effect the combustion of the tar under much better conditions than if the substance were used alone.

The plant required for the operation is shown in the accompanying illustration, in which fig. 1 is a general view (partly in section) of a group of appliances suitable for the purpose; fig. 2, an elevation of a tar-heating vessel, provided with a nozzle for the ejection of the tar in a continuous spray; and fig. 3, one in which the discharge of the tar is effected simply by its own gravity.

Fig. 1.

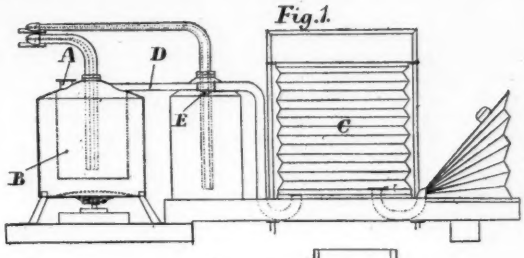


Fig. 2.

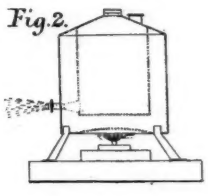
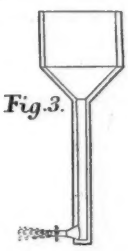


Fig. 3.



Before reaching the plant, the tar is raised nearly to boiling-point, and strained through close wire gauze, so as to remove from it any foreign matter calculated to obstruct the sprayers. It then enters the plant by the opening A in a receptacle B having a double bottom, which may be heated by any suitable means, such as a lamp, as in the diagram. Into the inner reservoir, containing the tar, passes a pipe of small diameter, one end of which dips to nearly the bottom of the vessel, while the other is at the point where the tar is to be burnt. On this end is mounted a sprayer, of a type suitable for injecting the tar into the furnace. The device to the right of the diagram is to enable sufficient air pressure to be obtained to drive the liquid tar up through the pipe in the reservoir to the sprayer at the requisite speed. A bellows is shown; but an air-pump of any kind, and worked in any way, may be substituted. In order to ensure greater regularity in the delivery of the compressed air, it is not sent direct on to the tar, but is conveyed into a special receptacle C, whence it is run through the small horizontal pipe D into the vessel B. The air-pipe is divided—one portion D delivering above the tar, and the other E passing into a water-tank, where it makes the water rise in the pipe shown, on the free end of which there is a suitable sprayer, placed as close as possible to the one used for tar. The combination of the two sprayers ensures good combustion of the tar. When used alone, it burns with a dark reddish suffocating flame; whereas the water causes it to burn with a white flame and clean smoke.

In starting the plant, a small wood fire is kindled in the furnace into which the tar is to be injected; and when once the tar has become ignited, the apparatus acts as an ordinary burner. In the illustration, the sprayers are shown parallel to each other, the jet being thrown horizontally. But they can also be fixed so as to produce vertical jets. Instead of injecting the tar and water in the form of spray, it may be desired to use the liquids in a stream. In this case, the sprayers would be replaced by appropriate nozzles; and air pressure can be dispensed with by placing the two receptacles at a convenient height above the orifices, so that the liquid may flow by gravitation. The water employed for spraying and injection can be heated to the requisite degree by some suitable means, in the same way as the tar; and electricity may be employed if economically available. Jet injectors can be used for atomizing the tar, with the aid of air or steam under pressure.

At St. Paul's Church, Colwyn Bay, on Monday last week, the wedding took place of Mr. James Taylor, Engineer and Manager of the Mossley Corporation Gas-Works, and Miss Laura Buckley, daughter of Mr. Thomas Buckley, of Colwyn Bay. After the ceremony, a reception was held by Mr. and Mrs. Buckley at the Hôtel Métropole, Colwyn Bay.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

Half-Yearly Meeting at Stamford.

The old-world town of Stamford on the borders of Lincolnshire was visited by the members of the Eastern Counties Association for their half-yearly meeting—the forty-first—last Wednesday; an invitation having been extended to them by the Chairman (Mr. G. Edmonds) and Directors of the local Gas Company, and their Engineer and Manager (Mr. J. West).

The programme opened by the fulfilling of an engagement to lunch with Mr. Edmonds and his colleagues at the Stamford Hotel. Mr. Edmonds was in the chair; and he was supported by the President of the Association (Mr. C. F. Ruggles, of Leighton Buzzard), Mr. G. Higgs, J.P. (Vice-Chairman of the Company), Mr. J. Ringham, Mr. C. Atter (Town Clerk), and Mr. R. Ryman (Borough Surveyor). There were about 75 present at the luncheon; and among the visitors were noticed Mr. W. Ford, of Stockton (President of the North of England Association), and Mr. Charles Meiklejohn, of Rugby, who looked exceedingly well after his Mediterranean trip. After luncheon, the President said by request there were to be no speeches at this part of the proceedings; but he should feel wanting in duty and appreciation if he did not at once propose a hearty vote of thanks to the Chairman and Directors for their invitation, reception, and hospitality. The suggestion was heartily endorsed. The Chairman thanked the President for the kind manner in which the vote had been passed—remarking that the Directors of the Company were delighted to see the members of the Association in the town for the first time. Although the gas-works were so small as to be scarcely worth the attention of those of their guests who came from much larger places, yet he hoped the members would do the Company the honour of paying them a visit. He had pleasure in welcoming the Association on behalf of the Directors of the Company; and hoped the meeting would be successful and enjoyable.

Visit to the Gas-Works.

Informally several of the members visited the gas-works; and they were not disappointed. They found everything in orderly condition; and all the evidence required that the Directors and the Engineer and Manager (Mr. J. West), within the limits of their opportunities, are intent on keeping up to modern practice on the technical side of their business. The latest thing claiming attention was found in the retort-house, where part of the old carbonizing plant has been removed, and a modern bench put up in its place. The scheme for this was entirely formulated by Mr. West; and it was carried out under his supervision—Mr. R. G. Shadbolt, of Grantham, being called in to make an examination of the proposals. As a result, he unhesitatingly endorsed Mr. West's plans. The retort-house practically consists of two houses; there being a partition with access from one to the other part. In the one part, there stand three settings of sevens, direct-fired; and in the other part, there formerly stood five settings of fives and one of fours, also direct-fired. This latter is the part of the house that has been remodelled, and the carbonizing plant brought up to the more scientific practices of the times. In considering the scheme, certain curtailing problems were encountered. It was found that the subterranean water would not allow the retort furnaces to be carried any great depth below the surface; and, on the other hand, a stage-floor was impracticable, owing to the lowness of the roof, and the walls not being of sufficient strength to justify raising the roof. So between these two limits the Engineer was restrained. The result was the adoption of shallow regenerators, with travelling platforms in front of the bench, a shortening of the height of the ascension and arch pipes, and the making of openings through the roof, primarily for the cleaning tools, and secondarily for securing better ventilation above the bench. The reason that Brooke's patent shallow regenerator system was adopted was that it gives a large amount of heating surface to the secondary air. The patents for this system are the property of Messrs. Robert Dempster and Sons, of Elland; and they were the Contractors for the new bench.

In passing, it may be mentioned that in making the excavation for the furnaces an old archway was found; but no one can trace or divine the purpose for which the archway formerly existed. It must remain one of the little unsolved problems of history. However, the new bench which was inspected comprises five settings of eight retorts, 22 in. by 16 in. by 10 feet, single ended, with, as remarked, Brooke's patent shallow regenerator system. Each arch has its own separate hydraulic main; and the mountings and equipment consist of 6-inch ascension, arch, and dip pipes, self-sealing mouthpieces, retort-house governor, and tar-tower. The seal on the dip-pipes can be regulated by means of a valve fixed to each hydraulic main, or by the tar-tower. A few words about Brooke's regenerator. In this system, the secondary air travels inside parallel rows of rectangular tubes, each 9 inches deep and 6 inches wide. The stay walls in the setting are continued down through the regenerator; and into these walls the secondary air tubes joint. By this arrangement, in conjunction with a set of dampers at the bottom of the regenerator, the draught between each stay wall can be regulated to a nicety, and the main draught be controlled by a main damper—that is to say, it can be subdivided between the different stay walls, so as to obtain absolutely perfect heating. With this arrangement, the combustion chamber can be worked at lower heats than have been customary, as the heat, after leaving the combustion chamber, rises between each stay wall and descends between the pier wall and the outside retorts in a direct and simple manner, instead of undergoing any tortuous travel—that is to say, it simply goes straight up and down. One arrangement in connection with the setting was pointed to as a subsidiary but useful advantage and convenience. It is the introduction of an additional damper, which is used to curb the draught on the setting when the producer is being clinkered, and thus stop the inrush of cold air into the setting during the operation. When this is finished, this particular damper is again opened, and the original draught on the setting is restored—just as before clinkering started. It was learned from Mr. West that these settings have proved extremely economical in fuel; and inspection showed perfect heating. They were started about last September; and it is found that the maximum productive capacity of the settings is some 300,000 cubic feet, which means that about twice as much gas as formerly can be produced on the same ground space. The managers of small gas-works should make a note of the fact that there is the proof here that they are not confined to an antiquated carbonizing system, but that the benefits of more scientific operation are within their reach.

There is yet to be dealt with what was to most of the visitors the novel feature of the two travelling platforms. These are constructed in accordance with Scott and Dempster's patents—Mr. F. Scott, the Engineer and Manager of the Galashiels Gas-Works. The objects and advantages of the platforms are well demonstrated at Stamford. There is the open subway, and over it the two travelling platforms, which, running on ball-bearings, can be easily moved by hand into any position, and at all times leaving a taut wire-rope hand-rail over the parts of the subway not covered by the platforms. Here the conditions limited choice. A closed-in subway would have been impracticable, excepting at a prohibitive cost. The open subway, with movable platforms, was the most practical method of dealing with the situation. In addition to the advantages of attending to the furnaces in, to all intents and purposes, the open house, there are, it is seen, several considerations, in such houses as this one, favourable to the mode of construction and the use of the platform. The men engaged in clinkering operations are protected from scalding by steam generated by large pieces of clinker dropping into the ash-pan; and the clinkering operations can be performed in daylight. The Manager can see at a glance, too, that the subway is kept tidy and clean, and that there has been no tampering with the primary and secondary air dampers. He can also readily observe that water for feeding the fire-bars is being run into the tundishes, that there is no water running from the ash-pan, and that the air-inlets are free from ashes. Further, it enables the clinkers and ashes to be thrown up with the minimum trouble and labour. Free ventilation is also a consideration.

These are the features that particularly arrested the attention of the visitors; and the clean and solid character of the work carried out by the Contractors was the subject of remark by several.

THE BUSINESS MEETING.

The Business Meeting was held in the Town Hall—the President (Mr. C. F. Ruggles, of Leighton Buzzard) in the chair.

The Hon. Secretary (Mr. Thos. A. Guyatt, of Ely) read the minutes of the meeting held at Leighton Buzzard last September; and they were confirmed.

Annual Report and Accounts.

The President said all the members had received copies of the annual report and accounts, and he assumed they would therefore take them as read.

The report outlined the proceedings of the year, and concluded as follows:—

The year commenced with a membership of 97. One member resigned, and one severed his connection with the Association under Rule 19. Two new members were elected; leaving a total membership at the end of the year of 97.

The accounts show that a balance of £31 10s. 5d. was brought forward, and subscriptions paid during the year amounted to £57 15s.—making a total of £89 5s. 5d. The expenditure was £84 19s. 3d., which leaves a balance of £4 6s. 2d., and three subscriptions outstanding.

In accordance with the resolution passed at the spring meeting, the Committee selected a design for the Presidents' medals; and these were presented at the autumn meeting to all the Past-Presidents who were present. [The expenditure shown in the accounts for the Presidents' medals amounted to £29 14s. 7d.]

The usefulness of the Commercial Sections has been fully maintained during the year; and the benefit of these informal meetings and discussions on commercial matters is generally acknowledged. The sectional reports show that the average attendance has been good, and that many important matters have been considered, to the mutual benefit of the undertakings represented.

Mr. J. W. AUCHTERLONIE (Cambridge) moved the adoption of the report and accounts, remarking that, though the latter had been somewhat depleted by unusual expenditure, he thought they would soon right themselves.

Mr. J. H. TROUGHTON (Newmarket) seconded the motion, observing that he had no doubt the accounts would look more flourishing next year.

The motion was unanimously carried.

NEW MEMBERS.

The HON. SECRETARY read the names of the following gentlemen who had been nominated for membership: Mr. Joseph Hawksley, of Great Yarmouth; Mr. John Terrace, of Grimsby; Mr. Cyril Towers, of Brentwood; Mr. William Orme, of Woodbridge; and Mr. Augustine Davenport, of Mildenhall, Suffolk.

Mr. W. J. CARPENTER (Great Yarmouth), in proposing that these gentlemen be elected members, said he should like to impress upon them the importance of belonging to the Commercial Sections.

Mr. G. R. CASTERTON (Melton Mowbray) seconded the motion, which was unanimously passed.

GAS PRACTICE AT GREAT YARMOUTH.

Mr. W. J. CARPENTER (Great Yarmouth) read the paper on the above subject which is published on p. 216. In introducing it, he remarked that he thought the matters dealt with were such that a better discussion would take place by postponing the consideration of the paper until the next meeting, by which time the members would have had an opportunity of making comparisons with their own commercial methods and the results.

At the conclusion of the reading of the paper,

The PRESIDENT remarked upon its admirable character, and invited discussion.

Mr. R. G. SHADBOLT (Grantham) asked whether it would not be preferable to postpone the discussion. Although many of those present might be able to get up and talk generally round the subjects dealt with, he was of opinion they could not treat of the matters in the manner deserved, and they certainly could not draw comparisons until they had had the opportunity of consulting their own results. He thought there was much in Mr. Carpenter's suggestion that, if the paper was taken home by the members, and comparison made with their individual working, they would probably be able to show points where they compared well with him and equally in other respects they would no doubt find points where Mr. Carpenter led the way.

The PRESIDENT observed that, after all, he quite thought with Mr. Shadbolt it would be better to leave the discussion of the paper to the next meeting, which would, he believed, be held at Hull in September, in order to give an opportunity to make profitable comparison with their own working.

TAR FOR ROADS, DRIVES, YARDS, GARDEN PATHS, &c.

Mr. J. H. TROUGHTON (Newmarket) read a paper on the above subject. With a report of the discussion, it appears on p. 220.

VOTES OF THANKS.

Mr. R. G. SHADBOLT proposed that a hearty vote of thanks be accorded to the readers of the papers. Without being at all invidious, he might particularly call the attention of the members to the paper submitted by Mr. Carpenter, and for the excellent manner in which it had been got up. This alone was worthy of their satisfaction and appreciation. It showed the amount of time and work Mr. Carpenter had put into its preparation. The paper that Mr. Troughton had read was valuable for its practical suggestion. No doubt if the President had desired to prolong the discussion, the members might have gone on talking on this subject to dinner time, as most of them had had experience of the tar painting of roads. There was one little point he should like to mention; and it was that the authorities at Grantham tarred all the asphalt paths once a year for hygienic purposes as much as for extending the life of the paths.

Mr. W. H. MAINWARING (Lincoln) seconded the motion, which was unanimously agreed to.

Mr. CARPENTER, in reply, said both Mr. Troughton and himself thanked the members for the recognition of their little efforts that day. They undertook to do something, and they worked as hard as possible to make it interesting under the circumstances. He should make a point of being present at the Hull meeting; and he hoped as many members as possible would make comparisons in the meantime, so that there might be a profitable discussion.

ELECTION OF OFFICERS.

Mr. JOHN CARTER (Lincoln) said it was his duty to propose a successor to Mr. Ruggles in the dignified position of President. He was quite certain when he named for the position their friend, Mr. John Young, of Hull, he was naming one who would be equal to their utmost requirements.

Mr. J. S. DOUGALL (Boston) seconded the motion.

The PRESIDENT said the motion did not need any support from him; but he should like to say that they were all delighted when Mr. Young consented to take the presidency later in the year, and the members, he was certain, would be very pleased to visit Hull.

The motion was cordially passed.

Mr. YOUNG, in acknowledgment, said he was exceedingly grateful to the members for having made him President-elect. It was gratifying to him to know that he was succeeding to a position that had been occupied by an old master of his own—Mr. J. G. Hawkins. All possible would be done by him (Mr. Young) to uphold the dignity of the office during his year, and add to the usefulness of the Association.

Mr. H. WIMHURST (Sleaford) was pleased to say the choice for the vice-presidency had fallen upon Mr. Auchterlonie, of Cambridge. He had pleasure in proposing his election to the position. In due course he would worthily follow Mr. Young.

Mr. S. SHADBOLT (Kirkby-in-Ashfield), in seconding, said the members had the greatest confidence in Mr. Auchterlonie. He had shown much interest in the ordinary meetings and in those of the Commercial Sections.

The motion was cordially passed.

Mr. AUCHTERLONIE, in acknowledgment, thanked the members for the honour conferred upon him. It was not, he said, without a considerable amount of misgiving that he consented to accept the office, as he was aware of his own shortcomings, one of which was that he had no talent for public speaking.

Mr. YOUNG proposed the re-election of the Hon. Secretary and Treasurer. He remarked that he was sure the Association was well served in its secretarial work by their friend Mr. Guyatt. If he again accepted the office, the Association would be under a further debt of gratitude to him.

Mr. J. B. FENWICK (Retford) seconded, remarking that all the members appreciated the services rendered to the Association by Mr. Guyatt.

The motion was heartily agreed to.

Mr. GUYATT having returned thanks,

Mr. JOHN BARTON (Peterborough) proposed that Mr. E. G. Smithard, of King's Lynn, and Mr. H. Duesbury, of Hertford, be elected members of the Committee.

Mr. AUCHTERLONIE seconded the proposition, and it was adopted.

Mr. AUCHTERLONIE moved, and Mr. W. B. PALMER seconded, the re-appointment of the Auditors (Messrs. H. Wimhurst and T. Dann); and this was agreed to.

THE LIVESEY MEMORIAL FUND.

Mr. BARTON asked whether anything had been done by the Committee in the way of subscribing to the Sir George Livesey Memorial Fund. He knew the finances of the Association were low just now; but they would recover in a short time. Did the Committee propose to do anything in this matter?

The PRESIDENT remarked that the Livesey Memorial Fund had not been forgotten. It was, as a matter of fact, brought forward that morning at the meeting of the Committee; but it was thought, as the matter was not put on the *agenda* for the meeting, it would be better to bring it up for consideration at the meeting in Hull.

Mr. R. G. SHADBOLT: Supposing the fund is then closed?

The PRESIDENT: It will not be closed. Money can be taken at any time for the purpose of the fund.

FROM THE NORTH.

Mr. W. FORD (Stockton) said he wished to tender the President and Committee the sincere thanks of himself and the members of the North of England Association for the personal invitation to him to attend the meeting that day. It had given him the greatest pleasure to come among the members, and make new acquaintances and revive those acquaintances that had been somewhat subdued the last few years owing to his own ill-health. He was glad to have been able to come to one meeting of the Association before his time expired as President of the North of England Association; and he should be delighted if the President or any of the members could come to the meeting of his own Association at Newcastle [next Saturday]. There would be a hearty welcome for them. He also desired to thank the Chairman and Directors of the Stamford Gas Company for their kind invitation to him to be present at their luncheon.

The PRESIDENT said it was a great pleasure to him, as it was to the members generally, to have Mr. Ford with them that day. He was personally obliged to Mr. Ford for the invitation to Newcastle; but he was sorry to say he would be unable to be there. However, they hoped to see Mr. Ford among them many times in the future.

THE NEXT MEETING.

Mr. YOUNG proposed that the next meeting of the Association be held at Hull. The Directors of the British Gaslight Company would be exceedingly pleased to receive the members there. He hoped Hull would not be considered too far or out of the way for the members, and that they would have a large attendance. As a personal compliment to himself, he should like to have a record gathering.

Mr. TROUGHTON seconded the proposition; observing that it was his pleasure some years ago, as the then Hon. Secretary, to arrange a visit to Mr. Young's former works at Norwich. The members spent a pleasant time then; and he could promise that they would all spend a happy time in going to Hull.

Mr. WIMHURST suggested that, as the Association would attain its majority with the meeting at Hull, the Committee should take into consideration the question of doing something to celebrate the event.

THANKS TO PRESIDENT AND OFFICERS.

Mr. R. G. SHADBOLT proposed a vote of thanks to the President, officers, and members of the Committee for the way in which they had discharged their duties during the past year. Their President

had acquitted himself in the most courteous and amiable manner; and he had given full proof of his realization of the responsibilities of the office. As to Mr. Guyatt, no man could work with greater pains; and this was the eighth time he had taken the office of Hon. Secretary and Treasurer.

Mr. W. J. CARPENTER seconded the motion, which was heartily approved.

The PRESIDENT, in responding for all included in the vote, said that, so far as he was personally concerned, he did not deserve all that had fallen from the lips of Mr. Shadbolt. If, however, he had fulfilled the desires and wishes of the members, he was very pleased. He acknowledged the assistance he had received from their worthy Secretary and the Committee, as well as the kindness of the members in being blind to his own shortcomings.

This concluded the business proceedings.

DINNER.

In the evening dinner was served at the "George" Hotel. Probably some eighty sat down under the presidency of Mr. Ruggles. The Mayor of Stamford and the Chairman and Directors of the Gas Company were among the guests. The usual toast list was gone through; and music was interposed between the speeches. It was altogether a most enjoyable evening.

A DAY'S OUTING—FIRE-CLAY RETORT MANUFACTURE.

On Thursday, the weather was brilliantly fine, and several of the members enjoyed a visit that had been arranged to the fire-clay works of Messrs. Williamson, Cliff, Limited, who were through their processes able to impart both interest and instruction to the members. They were received by the Managing-Director of the firm; and, under his guidance, they thoroughly examined material, plant, and processes. Three grades of raw material were seen. They range from a fire-clay not far removed from 2 of silica to 1 of alumina to a silicious fire-clay containing 90 per cent. of silica. The firm have also a large quantity of ganister available, containing about 94 per cent. of silica. The information was given that there are no alkalies in the clays, or only traces; but they carry 1 to 3 per cent. of iron. Various grades of fire-brick and silica bricks are manufactured at these works for different purposes. The 90 per cent. silica clay is claimed as an ideal composition for the manufacture of the top or dome bricks for segmental retorts; and a large quantity of these were seen in the process of making. The clays, it was stated, will stand about 3300° Fahr., and are regularly supplied to work at 3000° Fahr.

Three methods of retort manufacture were explained: (1) The hand-made process, or the Newcastle style of building retorts in lifts of from 12 to 20 inches—an operation remarkable for the fewness and simple character of the tools used, and a method obtaining most extensively in this country in the Stourbridge district, where Mr. Albert Cliff said the clayworkers do this work with a skill and a finish almost equal to machine manufacture. By a second method, it was shown how retorts are made by hand; but the entire length is, with the aid of a few mechanical appliances, made without joint and at one operation. Long drums are clamped together to the required length; and the clay is built to fixed collars, fastened at each end, when laid in a horizontal position. They are spelked and set up vertically; and the inside cores or drums are withdrawn. This is a method which our guide said would widely prevail among the large hand retort makers, if once cultivated. It is a quicker process than No. 1. A jointless, perfectly straight, and even retort can be so obtained in the hands of a skilful and proper man. Method No. 3 was an explanation of the manufacture of machine-made retorts. Speaking as a manufacturer, Mr. Cliff preferred machine-made retorts on account of the speed at which it is possible to get an immense tonnage out of hand. On the other hand, he realizes that if gas engineers persist in their call for improved manufacture, it will probably move in the direction of clay working by hand.

Inviting the engineers to inspect a large quantity of finished retorts in the yard, special attention was drawn to one which had been made purposely for the occasion. This was a single retort, perfectly sound, of ⌂ section, the flat and sides of which had been made of aluminous clay and the dome or top containing 85 per cent. of silica. The experiment was to graduate and combine the two classes of material; and by mixtures and manipulation, to produce a retort calculated to remain stationary, to be gas-tight, to be a good heat conductor, to take extreme punishment if required, and generally to see if, in one whole piece, it was possible to make and fire at a high temperature and cool rapidly, and without fracture, a retort of more aluminous clay for the parts in contact with the stoking and charging apparatus, with a material heavy in silica for the top. This, it was learned, had been successfully accomplished; and experiments on these lines would be continued. The sample seen was strong, and would no doubt carry well.

Having gone thus far on the question of retort manufacture, Mr. Cliff was questioned on the subject of the discussion raised in the technical gas press by Mr. Bywater's Institution paper on fire-brick material and retort manufacture. He stated that this had encouraged the Editor of the "British Clayworker" to secure a writer said to be familiar with the processes of German retort manufacture to contribute some information on the subject. Two articles were contributed ostensibly for the instruction of British makers. If, in Mr. Cliff's view, these articles are an accurate survey of processes obtaining in German factories, they will strike English clayworkers as astonishingly belated contributions; and in many respects so hopelessly preposterous as to hardly merit challenge. The articles in many points were not credible—at least by Mr. Cliff—from any point of view. Another question referred to the work of the Committee appointed for the standardization of British fire-clays. The trend of the proposed work was considered by Mr. Cliff to be all right. Fire-brick people, he said, could hardly complain if men assist them with the complex problems involved in their work, and investigate them with knowledge and good sense. "Ignorance can never prevail over intelligence for long; and so light from any quarter is not to be spurned." Mr. Cliff said he did not believe in rushing to extremes; and it was rubbish to talk disparagingly of the rule-of-thumb methods which had no doubt in too full a measure obtained in an old manufacturing country like ours. Rule-of-thumb methods are a splendid legacy from the skilled workers of the past. They are the best ideas—and live because they are the best—which have filtered down through generation upon generation, and withstood the supreme test of trial and experience. It is equally stupid to have neglected chemistry. It is indispensable, and teaches us so much that we cannot discern without it. Yet we are called upon to remember that chemistry in clays is not an infallible guide; and there are subtle things about fire-clays which are likely still to baulk and elude our most accomplished chemists. However, the most constant thing in the world is change; and the manufacture of clay products is in a state of transition.

On these and many other points, the visitors gained knowledge; and on their behalf the kindness of the firm was suitably acknowledged by Mr. Ruggles.

THE FIRM'S HOSPITALITY.

The party were subsequently entertained by the firm at luncheon at the Crown Hotel. The President occupied the chair, and was supported by the Mayor of Stamford (Mr. T. S. Duncomb) and other leading residents. At the conclusion of the repast, the President said there would be only one toast, expressing the hearty thanks of the Association to Messrs. Williamson, Cliff, Limited. The members had all spent a delightful morning, and Mr. Cliff had been good enough to take them round and explain many things which were not only instructive, but of great value regarding fire-bricks and other products daily used in gas-works. From what he had told them, they had gleaned information upon securing the best material at the lowest expenditure. Mr. R. G. Shadbolt proposed the toast, and thanked the firm for their courtesy and hospitality. He said they had given the members a valuable object-lesson in showing how those who were not actually engaged in the production of gas assisted the industry by endeavouring to solve problems which affected its welfare and concerned every gas director and manager. In Mr. Cliff, the firm had one of the greatest assets such an undertaking could wish for; and he had admirably explained the difficulties that had to be attacked, and were being closely studied. Thus higher and better results were to be attained in the industry represented by the Association. He wished the firm all possible success, and trusted they would continue the important work of manufacturing and perfecting fire-resisting materials. Mr. Cliff, in acknowledging the toast, which was cordially honoured, said there was a special fitness in asking the members of the Association, as gas managers, to inspect the works, for there was a great deal of common ground between them and the firm he represented. All were interested in fire-brick manufacture and the distillation of coal—endeavouring to extract from the latter its utmost value. This was a problem that had to be faced by fire-brick people all over the country. No less than 14 million tons of coal were annually used in this way, and at present there was a vast amount of waste. It would be better for fire-brick manufacturers if they could combine for their mutual information, as did the members of the Association, and often rub shoulders. They would then go back to make even more successful efforts. Mr. Williamson also replied, and expressed the hope that the firm would in the near future, as the result of Mr. Cliff's endeavours, be even more capable than they were now of meeting the requirements of those engaged in the gas industry.

In the afternoon, Burghley House was visited; and there was a drive through the beautiful grounds. For this treat, there was indebtedness to the Marquis of Exeter.

Last Wednesday, at Crossgates Wesleyan Chapel, Leeds, the marriage was solemnized of Mr. Joseph Clayton, a Director of Messrs. Clayton, Son, and Co., and Miss Fanny Louise Cowell, youngest daughter of Mr. Charles Cowell. Among the presents was a silver tea service and tray from the workmen in the bridegroom's firm.

At the monthly ballot last Tuesday, Mr. Frank H. Jones (Messrs. H. E. Jones and Son), of Palace Chambers, Westminster, was elected a member of the Institution of Civil Engineers. On the same occasion, it was announced that Mr. H. G. F. Barham, of the Korean Water-Works, had been transferred from the class of associate members to that of members.

Mr. Charles Hussey, the Chairman of the Croydon Gas Company, has been elected representative of the Central Ward on the Croydon Town Council, in succession to the Mayor (Mr. J. E. Fox), who has been elected to the aldermanic bench. Mr. Julius Wilkinson, a Socialist, was Mr. Hussey's opponent; and this makes his fourth unsuccessful attempt to get into the Council since he resigned from it two years ago.

INSTITUTION OF MUNICIPAL ENGINEERS.

Last Saturday, a numerously attended meeting of this young Institution was held at the Building Trades Exhibition, which is now taking place in Olympia. The chair was occupied by the President (Mr. J. T. Pegge, of Durham); and at the commencement of the proceedings there was a short discussion on the question of examinations under one of the bye-laws, which reads as follows: "The Council shall cause examinations, open respectively to members and students, to be held in all the chief branches of the municipal engineering profession, and shall frame and publish rules regulating admission to, and the conduct of, such examinations, and shall award certificates or diplomas to those successful in such examinations." A Committee had been appointed to go into the matter; and they had drafted up a scheme, which it was thought might suggest some workable plan to the members. When the question was brought up, however, the President suggested that it should be deferred for another six months, and that in the meantime members should communicate further with the Council on the subject. Mr. H. Cubitt, as a member of the Committee, said the scheme was drafted with the idea of getting the views of the members. Considerable differences of opinion existed on the point. Other Associations had been perhaps twenty years in arriving at a satisfactory system of examinations; and it would not do for the Institution to act in a hurry. This was the view of the matter unanimously taken by the members; and accordingly the further consideration of the question was deferred for six months.

Subsequently three papers were submitted to the meeting; and, following the rule laid down at the first meeting of the Institution, these were taken as read—printed copies being in the hands of the members. In this way, the whole of the time at the disposal of the meeting was available for discussion; and full advantage was taken of it by those present. The titles and authors of the three papers were: "Essential Formulæ in Structural Engineering," by Mr. Horace Cubitt; "The Practical Sterilization of Water and of Sewage Effluents," by Mr. H. C. H. Shenton; and "The Design and Requirements of Electric Power Works," by Mr. Horace Boot.

At the adjournment, the members were invited to partake of light refreshments with Mr. H. Greville Montgomery, M.P., the organizer of the exhibition, who had arranged to accompany the members at the close of the meeting on a tour of inspection of the countless exhibits which are on view in the hall. A notice of these exhibits, in so far as they are of direct interest to readers of the "JOURNAL," will be found in another part of to-day's issue.

KEITH HIGH-PRESSURE GAS SYSTEM FOR LIGHTING AND HEATING.

At the Meeting of the Incorporated Association of London Dyers and Cleaners, held at the Dyers' Hall, on Monday last week, a paper on the above subject was read by Mr. H. A. Taylor Stoakes, of the James Keith and Blackman Company.

The author began by expressing his pleasure in submitting to the audience a brief description of the Keith high-pressure gas system, and explaining its application to the class of works in which they were specially interested, where, it was considered, gas-heated irons should be more generally adopted. No doubt the cost of gas in proportion to the benefits derived from its use had, he said, an important bearing on the profitable working of the allied laundry undertakings, where gas-heated machines were so largely used and good and abundant light was such a necessity. Those who employed gas in the combined businesses, and whose knowledge had been derived from costly experience, would, he thought, readily admit this proposition, and confess that they had spent to no purpose large sums of money upon governors, waste-preventers, and gas-saving devices of every description. They must not, however, overlook the fact that the details of their business, including the control of their gas, were carried out by women; and therefore it was necessary that any apparatus under their control should, as far as possible, be positive in its action. Nothing should be left to chance.

Coming to the practical part of his subject, the author remarked that when the incandescent gas-burner was first introduced, though it was a great advance on what had been previously accomplished, there was obviously a great opening for improvements. The burner was constructed to suit the average gas pressures in use, which might range from 1½ up to 4 inches. If the highest efficiency could have been obtained at the former pressure, the solution of the problem would have been easy; but it was otherwise. The firm with which he was connected, among others, experimented in this direction, and introduced the Keith light, working at a pressure of 8 to 10 inches. The velocity of the gas at the burner nipple was found to be sufficient at this pressure to take up the requisite quantity of air to ensure ideal combustion. The firm were still supplying lighting plants working at the pressures named, and giving upwards of 30 candles per cubic foot of gas consumed per hour. For some purposes, they recommended these plants as most suitable; but for the class of work under consideration, their latest type of apparatus, put on the market about a year ago, was more efficient and economical. By means of the improvements effected, the efficiency obtained from their burners was upwards of 60 candles per cubic foot of gas per hour. Though they were now working at 4 inches of mercury, equal to 54 inches of water, the pressure on the mantle of the latest type of burner was no greater than it was in the original type—being considerably reduced in its passage through the heating chamber at the bottom of the burner-tube, which was an essential and important feature of the firm's latest pattern of inverted burner lamp. The author described the heater, and then proceeded to deal with the fittings suitable for indoor and outdoor lighting. He stated that they range for the former from 60 to 300 candle power, and for the latter from 500 to 1500 candle power. A 120-candle lamp consumes 2 cubic feet of gas per hour; a 300-candle lamp, 5 cubic feet; a 500-candle lamp, 8⅓ cubic feet; and a 1500-candle lamp, 25 cubic feet.

Passing on to the question of cost, Mr. Stoakes cautioned his audience against being misled by statements appearing in the papers about the wonderful advances now being made in electric lighting, whereby gas is to be superseded in the near future. He assured them that these statements are at variance with known facts, and that gas is going ahead by leaps and bounds. He stated that, taking the average costs, the Keith light is as much cheaper than the best electric lamp as the ordinary incandescent lamp is than the old flat-flame burner. In support of this assertion, he gave the following figures, taking gas at 3s. per 1000 cubic feet, electricity at 3d. per unit, and the amount of light required at 10,000-candle power:

	Cost per Hour.
Carbon filament electric lamp	10s. 0d.
Osram lamps	3 1½
Do., with transformer	2 6
Ordinary incandescent gas	2 0
Keith light (latest type)	0 6

Mr. Stoakes asked his audience if it was worth while to generate electricity at the present time, with so small a prospect of resultant economy. He explained that the figures he had given were based on the results claimed by the manufacturers—viz., for Osram lamps, 1-candle power for 1¼ watts per hour on high voltage, and 1-candle power per watt per hour with a transformer; 15 candles per cubic foot per hour for ordinary incandescent gas-burners; and 60 candles per cubic foot per hour for the Keith burners, as tested by many authorities. With regard to maintenance, a metallic filament lamp went out of action at a cost of at least 3s. 6d.; but quite a considerable number of gas-mantles might be replaced for this money.

The next subject considered was the heating of irons; and the author pointed out that where economy is any object, the use of electricity for this purpose is entirely precluded. Referring to the Keith gas-iron, he said the key-note of its design is simplicity. Bearing in mind that it would be entirely under female control, a special locking device had been arranged, whereby when once the proper mixture of gas and air had been obtained, the air adjustment could be fixed in position, safe from any interference by nervous and hasty fingers. Though this necessary safeguard had been arranged, the burner body could still be taken to pieces for cleaning purposes without special tools. In the construction of the iron itself, special care had been devoted to avoid lighting-back, and to secure an even distribution of heat—in fact, to secure the maximum efficiency with the least possible consumption of gas.

Mr. Stoakes closed this portion of his paper by laying stress upon the fact that every type of gas-heated machine can be fitted with the Keith patent burners with the most economical results, and with little alteration to the apparatus itself. When the gas-services are properly arranged, all the lighting and heating appliances can be supplied from the same compressor without duplicating the mains; and, as all secondary air supplies are dispensed with, great simplification of arrangement results, allowing more working space, and reducing leakage to a minimum.

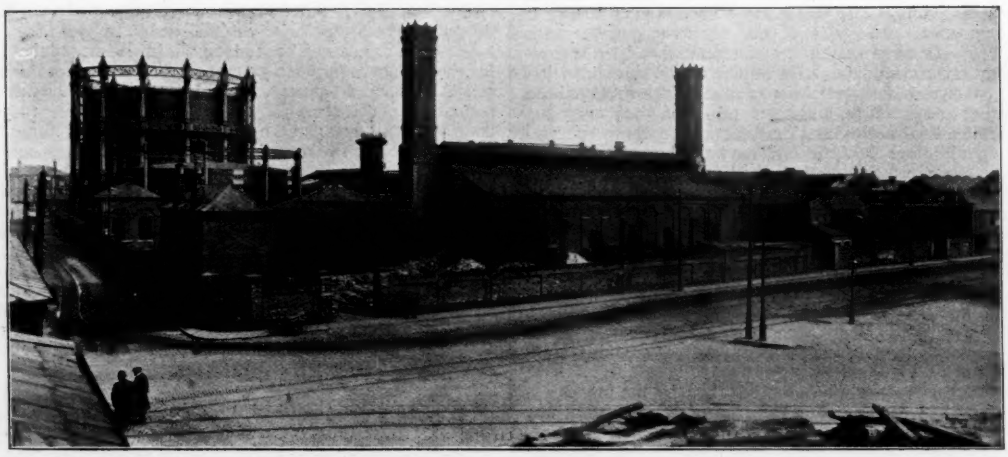
Having arranged for the lighting and heating fittings, the next question considered was that of the compressing plant; and Mr. Stoakes stated that for the special purposes of his audience the firm's water-driven machines would be unsuitable, on account of the low pressure obtainable, and that it would be necessary to instal a patent rotary compressor plant. These machines were, he said, made in sizes capable of dealing with the lighting of a town or meeting the requirements of the smallest laundry with only about half-a-dozen hand-irons in use. He gave details of the compressors, and said they were arranged either for being driven direct from live shafting, or coupled to a small gas-engine or an electric motor. He added that in most establishments it was customary to depend entirely upon one compressor; but, of course, plant in duplicate was desirable to obviate anxiety. Moreover, by duplication, the machine could receive proper attention when required. Mr. Stoakes said a good arrangement was to have a belt-driven compressor for general running, and one electrically or gas-engine driven to take up the work when the main engine was not required to be run.

In conclusion, the author pointed out that people who installed Keith plant must not assume that it would run on by itself for ever. Yet this was a mistake frequently made; and it caused vexation both to the user and to the maker. Every installation required regular and systematic attention. Maintenance was needed; but he claimed that in the Keith system it was reduced to a minimum. He impressed upon his audience the necessity, in order to reap the full advantage of the system in dye-works, to classify the work; but he assured them that, with it installed, there was absolute security against waste.

GAS PRACTICE AT GREAT YARMOUTH.

By W. J. Carpenter, of Great Yarmouth.

[A Paper read before the Eastern Counties Gas Managers' Association.]



The Works from the Boundary Road.

In order to be as comprehensive as possible, I purpose to briefly describe or outline the history of the Great Yarmouth Company, with works' items to date, and to follow with some of the most interesting and important commercial matters. I am afraid it will be said that little or no originality will be evidenced in the methods about to be described, or particular merit exhibited in some of the figures hereinafter to be described. The difficulty of initiative is greater perhaps than most; and although some of my subjects may be laboured, you may be assured of every care having been exercised in order to present accurate statements.

The gas lighting of Great Yarmouth was inaugurated in the year 1824, when a local worthy, Mr. G. S. Palmer, contracted with the Paving Commissioners to supply the town with the new illuminant of those days. It was not until twenty-one years later (1845) that a Company was formed for the purpose, quaint as it appears to-day, of carrying out the execution of existing contracts or arrangements with the Commissioners under the Act of the 50th year of King George III. (1810), and for making and executing any similar contracts or arrangements with the Commissioners, for lighting the streets, highways, lanes, rows, passages, &c., with coal gas. In 1863, the Company was incorporated by Special Act of Parliament, and from that time onward much progress was made in the development of gas lighting, which proceeded with the continuous enlargement of the works, purchase of land, and other important matters.

A General View of the Interior of the Works.

Plant at the Works.

With these few preliminary remarks, I propose to shortly describe the existing works and the arrangements of the Great Yarmouth Company for supplying the town with gas in all its up-to-date methods of application. The coal used is that of the best Durham varieties. For many years it was shipped in sailing vessels of small tonnage; the unloading being effected by the time-honoured "whipping" method, delivered into hundredweight bags, and carted to the store. Mechanical contrivances have been adopted in recent years, not only to cheapen the cost of the delivery and storing, but to expedite the discharge of the collier steamers now employed in freighting the coal from the collieries. Hydraulic power now takes the place of hand labour, and vehicles specially designed to receive the coal-skips are provided for the service. The saving in working amounts to £50 for each 1000 tons of coal delivered to the Company's stores. Coal-breakers, elevators, and conveyors are utilized in the storing of the coal; and compressed air machinery does the further work required in its carbonization. The general arrangement of the works provides for a daily output quite equal to present requirements, with a good reserve available for anticipated needs.

The gas is produced in retorts regeneratively fired; and the hydraulic mains are provided with liquor seals and tar-towers. Retort-house governors are now being brought into use. The make of gas per ton of coal carbonized averages slightly over 11,000 cubic feet. A tar-extractor follows the condenser and exhausters; and two tower scrubbers are employed with a rotary washer. One of these tower scrubbers is occasionally used for the reduction of naphthalene present in the gas; and the rotary machine is also used in part for dealing with naphthalene. It has been found that if a fair quantity of accumulated washed-out tar is allowed to remain in the mechanically driven washer, considerably less oil is needed in washing to keep the naphthalene within reasonable limits. The oil employed is carefully distilled strained anthracene oil obtained from the tar-works belonging to the Company.

The purification of the gas is brought about by oxide and lime, and finally a carburettor is used through which a fair proportion of the outgoing gas is made to pass. Ordinary paraffin oil only is employed. This latter process has been in use for some years with good results.

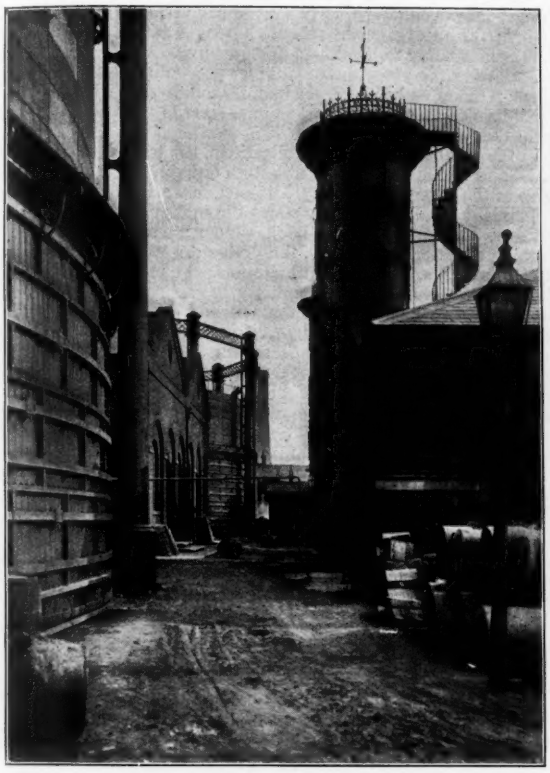
Distribution.

It was not until 1889 that steps were taken to actively push the sale of gas by means of the gas-cooker, to be followed a few years later by the introduction of the automatic gas-meter system. Hitherto the distribution arrangements had been much in common with those usually obtaining in many contemporary concerns, both in and out of the district of East Anglia—that is to say, no responsibility was undertaken beyond the fixing of the meter on the consumer's premises, the local gas-fitter doing all required therefrom. Alike to the experience of others, the supply of gas appliances of all kinds and modern construction, requiring trained intelligence in fixing and methodical attention when in use, has entirely changed the old order of things, until the Company is now equipped with its various departments of gas-fitting in all its branches, maintenance and repairs of cookers, the maintenance and upkeep of incandescent burners, hiring of outside lamps, &c. Competition has done much to bring about this most desirable change in the interest of the consumers; and the Company's position has shown further strength in its new condition of things.

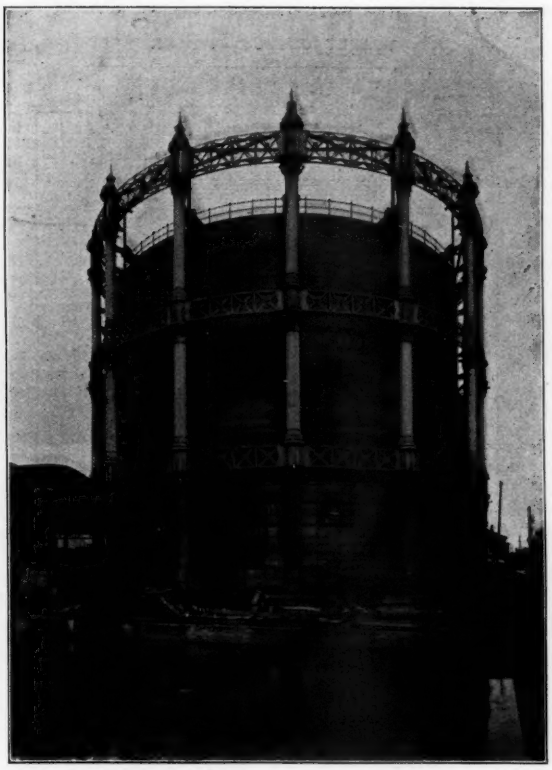
Overlooking the antiquated, and perhaps it may be truly said autocratic, conditions at one time prevailing in gas administration, and adopting ideas in line with the circumstances as they are found to-day, let it suffice when I say that the business of sales and distribution is carried out quite on the lines of shop-keeping as observed in successful commercial undertakings. Every attention is devoted to the question of obtaining new

consumers, and to their wants when once on the books of the Company. Suitable arrangements have been provided so that the business may be conducted with comfort to the customers and credit to the concern. In the establishment of the gas-fitting department, the importance of having well-educated and properly addressed fitters, led to the adoption of the apprenticeship system, which was started some four years ago. [By the way, it is a pity that apprenticeship is not in common practice throughout the country; the advantages of it to the industries, and to master and youth alike, being paramount.] Gas appliances of all approved kinds are hired at nominal rates, or sold at cost price. In some instances, it has been found necessary to accept even less than cost price, to secure business in these competitive days. The object is to make a profit out of the gas used, rather than by that of the appliances sold. All the various appliances are fixed free, irrespective of length of service, similar obstacle, or hindrance.

The coin-meter has become very popular in Great Yarmouth, until at the moment there are over 3000 in use; and the system provides a most important factor and ever increasing part of the total revenue of the Company. Practically no limit is determined respecting the requirements of the slot-meter consumer. He may have as many lights as desired; and a specially-constructed cooker, gas-fire, or hot-plate griller, &c., with boiling rings, are provided free. It is found necessary in Great Yarmouth to provide a large size slot-cooker with hot-plates of good dimensions, to suit the exceptional requirements of the lodging-house keepers of this seaside resort.



Looking through the Works.



One of the Gasholders.

MONTHLY AVERAGE HOURLY OUTPUT OF GAS.

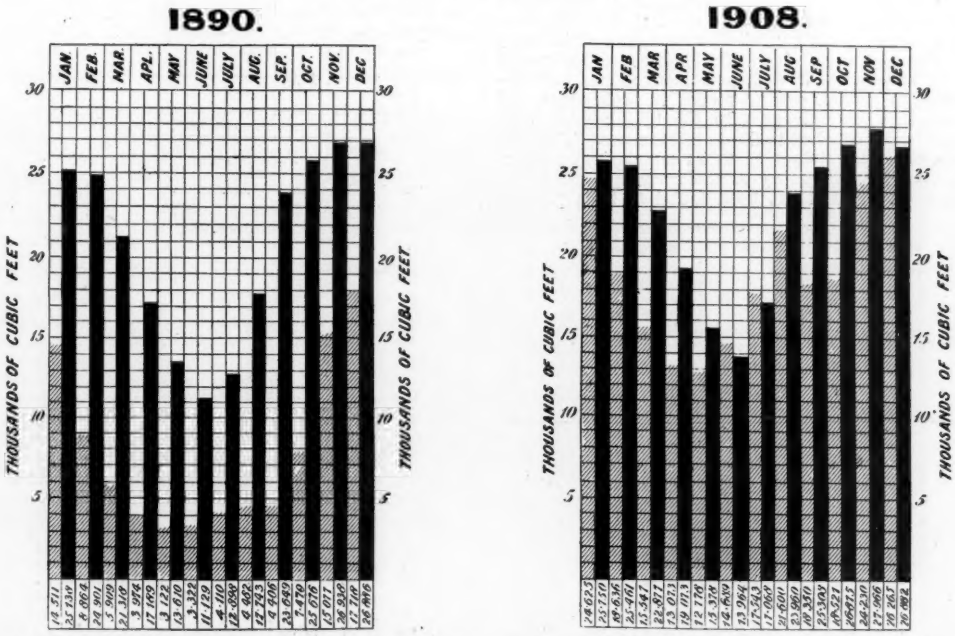


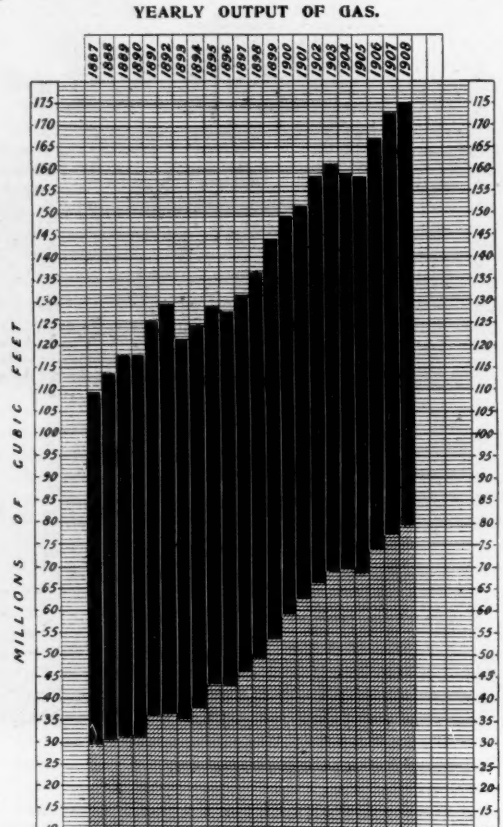
Diagram showing the Levelling of the Load-Line due to the Increase in Day Consumption. The Figures at the Foot of each Column are those of the Average Hourly Output.

The Day Proportion (6 a.m. to 6 p.m.) is Shown Light.

The effect of the introduction of gas appliances for use during the day shows, when plotted on a diagram, the more even character of the load-line during the year 1908, compared with 1890. It has brought about many advantages in working, as during some months of the year the gasholders are but governors, and the necessity for increased storage does not arise.

Coin-Meter Collection.

In accordance with the experience of others having the coin-meter system in operation, the uncollected, and also the empty,



Gas Cookers were First Hired in 1889.
Coin-Meters were Introduced in 1895.
Electric Lighting was Commenced in 1894.

meters become the prey of the thief, who not only remove the money, but damage the meters and properties in which they are allowed to be employed. This pilfering and consequent damage cause considerable anxiety; and much thought has been given to the numerous ideas suggested, with a view of bringing about a better state of things. It was decided to alter the system of collecting by shortening it to two collections per month—thus leaving a much smaller sum of money in each meter, and reducing the obvious attractiveness to the thief rendered by well-filled money boxes attached to flimsy meter cases. This step was not taken without misgivings as to its popularity or otherwise with the householders, owing to the system necessitating more frequent calls. But it has been found to be a positive convenience to them in the way of the facility given to report and have any little trouble or irregularity of supply put right. By this innovation, the Company benefit appreciably by turning over the ready money more frequently; and instead of locking up so much copper coin, it is necessarily advantageous to keep it in circulation. The system also allows of the empty houses being quickly reported and the meters removed—thus avoiding damage to a meter, with perhaps an empty money-box. Again, the return of the meters to the store ready for re-fixing considerably reduces the expenditure under this head. Moreover, the landlord is protected; the success of the scheme having practically stamped out burglarious entry to dwellings and buildings.

Following the unfortunate troubles prompting the introduction of the remedy as before described, it is interesting to record the small loss of 6s. 9d. from two meters—one in 1907, and the other early this year.

In the arrangement of the collections, the town is divided into A, B, and C districts, giving about an equal number of meters to each of the three collectors. These each work singly, carrying a convenient hand-bag. They count the money, and give a receipt out of a duplicating receipt-book. On returning with the afternoon's collection completed, the collectors make up the coppers into 5s. packets, and pay to the appointed clerk, who, with other clerks, promptly checks the entries in the receipt-books before each following day's work is commenced. With the commencement of this system of collecting, it has been made a positive rule that each collector takes a different district at the beginning of each month. This rule has many advantages to recommend it, and has been the means of bringing about a more complete organization generally. The cost of collection per meter per annum works out at 1s. 3·24d. I should like to suggest to the members the convenience of this figure in making comparisons. The following extract from a handy "Records" book will convey some idea of the way the work proceeds.

Slot-Meter Records.—Quarter ending Lady Day, 1909.

1909. Date.	Number of Consumers.	Districts of Collectors.	Amount of Collections.		Increase on 1908, Per Cent. of Collections.	Monthly Amounts Collected per Consumer.	Increase Per Cent. of Consumers.
			£ s. d.	£ s. d.		s. d.	
1st Collection, January		A	111 10 10				
		B	140 8 6				
		C	144 7 5				
2nd Collection, January		A	89 14 6				
		B	107 4 6				
		C	102 1 1				
	3021			695 6 10	6·9	4 7	13
1st Collection, February		A	78 1 4				
		B	97 3 6				
		C	93 9 3				
2nd Collection, February		A	68 3 1				
		B	87 18 3				
		C	86 2 5				
	3015			510 17 10	6·4	3 4	11
1st Collection, March		A	72 16 8				
		B	84 13 4				
		C	80 7 11				
2nd Collection, March		A	73 17 0				
		B	94 1 5				
		C	91 13 11				
	3070			497 10 3	15·4	3 2	12
Total and averages:—				1703 14 11	9·5	3 8	12

Year Ending Christmas, 1908.

	£ s. d.	s. d.	
Total and averages	7300 15 11	14·9	4 2	13

Table *showing Output of Gas* (1887-1908), *with Proportion Due to Day Consumption.*

—	1887.	1890.	1893.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.
Yearly total gas sold (millions)	109·402	117·808	121·094	131·792	136·593	143·951	149·048	151·816	158·202	161·255	159·116	158·154	167·037	172·860	175·066
Day ratios to ditto	27·85	27·09	29·60	37·40	33·88	37·09	39·79	41·30	42·05	42·82	43·66	43·43	44·30	45·01	45·35

Table *showing Ratio of Day Consumption to Total Monthly Output.*

January	34·86	36·08	38·35	42·31	42·05	41·25	44·85	45·72	46·65	47·28	47·22	46·31	46·18	48·36	47·95
February	26·57	26·87	28·83	34·00	34·17	34·03	39·32	39·37	42·31	39·44	42·21	39·93	41·60	43·28	41·91
March	20·13	21·26	18·49	25·40	28·82	28·19	33·39	35·55	33·02	35·38	37·13	35·90	37·90	36·98	39·99
April	16·98	18·55	18·18	25·67	26·63	27·92	31·86	33·71	35·47	36·58	36·33	36·87	36·75	39·38	40·59
May	17·76	20·86	23·30	30·21	31·49	33·19	36·17	39·07	39·74	40·82	42·57	42·93	42·54	44·59	45·58
June	20·54	23·24	28·19	36·18	39·65	38·39	41·23	45·16	45·98	45·63	47·76	49·21	48·51	50·42	51·45
July	19·98	24·38	26·12	36·03	36·56	40·37	42·91	45·13	44·92	46·74	47·87	49·81	50·33	50·96	51·21
August	16·06	18·82	22·80	32·40	35·15	37·86	39·88	42·33	42·77	43·69	45·71	46·57	47·33	47·53	48·04
September	14·78	15·91	19·22	26·80	29·76	32·74	34·93	36·06	37·67	38·84	40·21	39·42	41·51	41·94	42·14
October	22·99	21·93	29·67	33·14	32·29	33·09	36·14	36·13	37·78	38·61	38·90	38·41	40·21	41·18	40·78
November	36·60	35·45	37·57	42·00	41·65	42·04	45·19	45·03	44·65	46·13	46·79	45·81	46·59	45·91	45·72
December	41·07	37·96	41·69	44·90	44·39	46·29	45·19	47·84	48·69	49·77	47·89	47·45	48·54	48·60	48·81

Note.—The above tables demonstrate the gradual and important growth of the day-load, and they are not without instructive reflection. Among the collateral advantages derived from an even load, the economy in expenditure due to gasholder construction is by no means the least.—W. J. C.

Difficulties in Distribution.

I purpose now to deal with the difficulties met with in the required attention to the growing needs of the consumers. In the first instance, attention will be drawn to the carefully compiled summary of complaints. This compilation is the result of work commenced in 1886. The figures given, although in concrete form, include many interesting abstract items of the recorded complaints. Enumerated, they are as follows: Insufficiency of supply due to water, corrosion, naphthalene, and meters; leakages of gas, due to meters, meter connections, main taps, services, mains, and fittings. Some little extra trouble has been occasioned in very hot weather by the collection in the fittings of water through condensation, and considerable attention directed towards finding a remedy for this very inconvenient description of complaint. The best thing to be done, so far as my experience goes, is to cover the water in the gasholder tanks with paraffin oil and avoid contact in this way. This is done regularly just before the hot weather commences; about 150 gallons being used for a gasholder tank 100 feet in diameter, and in proportion for other diameters.

Several of the enumerated heads under which are tabulated the respective number of complaints do not give cause for much comment; the record being fairly regular, and presenting no particular difficulty. Complaints due to leakages in the fittings, gas-cooker taps and slot-meter installations show an increasing figure; but this must be expected and looked for, seeing that the Company are owners of such a comparatively considerable distributing plant and under obligations as to its upkeep and maintenance.

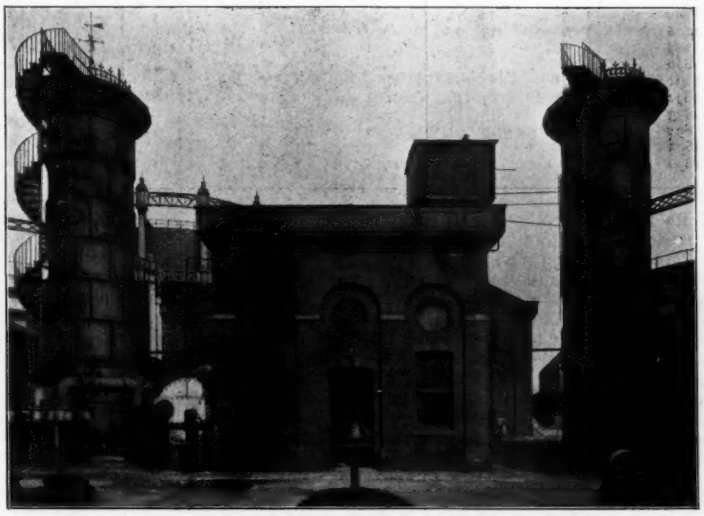
Summary of Complaints.

	Total Number of Complaints.	Total Number of Complaints per Cent. of Consumers.		Total Number of Complaints.	Total Number of Complaints per Cent. of Consumers.
1886	416	4·01	1898	1596	12·6
1887	798	7·65	1899	2191	16·3
1888	470	4·55	1900	2025	14·3
1889	554	5·41	1901	3241	22·3
1890	754	7·43	1902	2382	15·8
1891	782	7·70	1903	1858	11·8
1892	738	7·43	1904	1929	11·8
1893	845	8·70	1905	1852	10·3
1894	659	6·70	1906	2577	13·0
1895	1157	15·30	1907	2186	10·3
1896	1123	10·60	1908	2123	13·9
1897	1322	11·40			

Naphthalene.

One cannot pass so lightly over the recorded figures as to complaints due to naphthalene. The records in the summary of complaints go back to the year 1886, when the gas was produced in oval and round retorts, well charged and at a moderate temperature. Naphthalene was not a trouble in those days, but gradually made its presence felt as higher temperatures were brought into use, until in 1901 the complaints reached a startling total. Means were then taken in hand to reduce the naphthalene present in the gas by washing with anthracene oil, with an accompanying process by which paraffin was vaporized and allowed to pass into the outgoing gas. The experience gained by the interesting character of the experiments made in the early working of the process more than compensates for the trouble taken in attempting to reduce our theory to practice in this very complex subject. The processes are still persevered with; and at the moment we do not consider the naphthalene complaints a nuisance. Taking the last four years, we find from our records a yearly average which works out at just under two complaints per day—in point of fact, the figure is 1·93.

It is now an accepted idea in the management of gas affairs in Great Yarmouth that more trouble has been found through the deposition of naphthalene in the services after salt water had been substituted for that of the town water supply. This opinion has been formed by the close observance of the prevalence of complaints as to the supply of gas and otherwise in certain districts most freely deluged with the briny element.



The Station Meter House and Scrubbers.

Interior of the Purifier-House.

Maintenance of Incandescent Burners.

The maintenance system as applied to incandescent burners has met with success, and helped very considerably in keeping gas well to the front by the maintenance in efficient condition of the shop lighting, out-door lamps, and consumers' indoor installations. No system of hiring or even selling lamps can be attended with success, if the upkeep is not insisted upon. The cost works out at 2s. 11·25d. per burner per annum; and although the department still shows a small loss, it is an expenditure proved to be well worth incurrence.

Coke Sales.

Having exhausted the more important features of distribution, it may be of interest to the members to know something of the sales of coke, as shown by the returns of the Company. The following statement [see next page] gives full particulars of the price realized per ton of coke, with the price paid for coal into store for the years 1885 to 1908, both inclusive.

The sales of broken coke for domestic use were commenced 20 years ago, and better average prices than otherwise possible have been maintained, through the support given by consumers to this useful and economical fuel. At the time of this new departure from existing practice, little or no coke was delivered directly through the agency of the Company. Local malting (and Norfolk is a barley county) accounted for much of the production of coke after the ordinary "over the counter" customers had been satisfied. It was felt that better figures could be realized by undertaking the breaking and delivery of the coke, to be supplied at popular and remunerative figures. It happened fortunately that these steps were taken at this time, seeing the trouble resulting some few years later in the disposal of gas and other coke due to the restrictions placed upon maltsters in the use of coke for the production of malt. The system was commenced by means of advertisement; and perhaps the best type of advertisement has been found in the provision of suitable lorries and carts, well horsed in well-kept harness—the particulars of the product for disposal being prominently displayed on the fronts and sides of the vehicles. The delivery of unbroken coke was also included in the scheme—the smallest quantity delivered in each case being 1 cwt. It is significant of the striking popularity of broken coke to record the complete neglect of the unbroken material; and a delivery of the latter is of rare occurrence.

Owing to the mild autumn and early part of the season we have just experienced, the question of accumulating stocks was considered at one of our Commercial Section meetings; and it was generally conceded by the members present that greater efforts were needed individually in order to promote, in a greater degree, the local sales of coke, even to seriously considering the question of 28 lb. parcels. Accepting the suggestion, and feeling assured

Cost of Coal and Price Realized per Ton of Coke.

Year.	Coal Price. s. d.	Coke Price Realized. s. d.	Year.	Coal Price. s. d.	Coke Price Realized. s. d.
1885	13 11	11 3	1897	13 7	11 8
1886	12 8	11 7	1898	13 11	12 5
1887	13 3	11 7	1899	14 1	15 3
1888	13 6	13 7	1900	17 8	19 3
1889	13 9	11 8	1901	17 2	15 9
1890	14 11	14 5	1902	14 11	16 4
1891	15 6	14 10	1903	14 3	16 9
1892	16 0	14 4	1904	13 7	17 4
1893	14 0	13 4	1905	13 1	14 3
1894	13 7	15 5	1906	13 2	15 9
1895	13 1	13 5	1907	15 5	16 3
1896	13 3	14 0	1908	15 6	18 0

of its importance, immediate steps were taken by the Great Yarmouth Company to endeavour to increase the total coke sold in the town through the medium of 56 lb. parcels. This development had the advantage of extensive advertisement in the local journals. Comments were made in the general news columns as to the usefulness of the system, handbills were distributed from house to house, the town was posted, and an immediate response on the part of small consumers resulted. It was evident that the poorer classes appreciated the delivery to their doors of ¼-cwt. bags of broken coke, at a proportionate price to that charged for larger quantities. The inclusive price for the coke, breaking, and delivery, is at present 14d. per sack of 1 cwt., and 7d. per half sack.

The demand for the smaller quantity is getting quite a feature of the every-day delivery; and in order to foster the business, offices for receiving orders have been arranged for in the three districts of the town. Of the total of the sales of broken coke during February and March last, 30 per cent. is accounted for by the quantity sold in small parcels. This figure also represents the increase in this particular trade over the period mentioned as compared with the corresponding months of 1908. Great Yarmouth, owing to its geographical position, is not well situated for the local and immediate district disposal of coke. In similar instance to other towns where railway companies have to meet the competition of sea carriage, the rail rates are arranged on a lower scale than those applying to surrounding points of fuel consumption. It is in consequence quite common to find some of our Midland friends—Nottingham, Leicester, and Yorkshire—selling coke *viâ* Great Yarmouth (it is not routed thus) and cutting the trade in the town and its vicinity. To combat competition of this kind, the practice observed year by year is that of the maintenance of the quality of the coke, by securing the coal most suitable for its production.

Coke Sales.

Year.	Total of Sales. Tons.	Tonnage per Cent. of Total Sales. Delivered into Craft or on Rail.	Local Sales Unbroken. Tonnage per Cent. of Total Sales.	Local Sales Broken. Tonnage per Cent. of Total Sales.
1894	4553	28·3	68·3	3·4
1895	5362	38·8	54·4	6·8
1896	4723	39·5	52·5	8·0
1897	5381	42·2	52·0	5·8
1898	5218	47·3	45·9	6·8
1899	5235	33·8	61·7	4·5
1900	5502	34·5	59·7	5·8
1901	5806	36·8	54·1	9·1
1902	5774	31·8	57·5	10·7
1903	5746	36·1	52·8	11·1
1904	5168	28·5	58 3	13·2
1905	6050	41·6	48·7	9·7
1906	6075	42·7	46 9	10 4
1907	7033	44·7	43·9	11·4
1908	6313	41·5	44·7	13·8

A Word for Commercial Sections—An Appreciation.

It is intensely interesting to note the growth of what is now called the "New Commercialism." Although I have to admit a reluctance in joining any Commercial Section, I am now most enthusiastic in the important work so ably carried out by the gentlemen who have devoted much time and help to its development. The frequent meetings provide the advantages of general discussion of that informal character conducive to the collection of desirable information to be gained in no other way. Gas companies and gas committees are greatly benefited by sending their representatives to the meetings arranged at convenient times and places; and I cannot too strongly advise the importance of the maintenance of the interest of the members themselves in this regard. These remarks may be considered somewhat extraordinary, coming from one whose support did not originate with the inception of our section; but I can most assuredly affirm that, among other benefits, the Eastern Commercial Section, news, and work, together with that of our Western contemporary, has been very material in the determination of the prices realized for residuals by the Company I represent, and I have pleasure in making this record of the advantages derived.

In conclusion, allow me, if I may, to emphasize the importance of the maintenance of strict attention to minute detail in the conduct of all affairs affecting the concerns we represent. In whatever capacity our services may be directed, the question and observance of detail is the direct point at which success begins. We are all of us judged by results; and the figures of our annual balance-sheets are indicative of the work undertaken to promote financial and economical excellence.

TAR FOR ROADS, YARDS, GARDEN PATHS, &c.

By J. H. Troughton, of Newmarket.

[A Paper read before the Eastern Counties Gas Association.]

Owing to the depression in the tar-distillery business, coal tar is almost a drug on the market; and the price distillers offer for the surplus has induced many gas engineers to look about for fresh outlets for its use and disposal. Some are burning it for heating boilers, with satisfactory results; while its usefulness for painting roads and mixing with road-making material seems likely to create an increased demand by county councils and urban authorities as an antidote to the dust nuisance brought about by motor-cars, which is the principal cause of prejudice against their use at present. It is, however, my desire to put before the members of the Association my experience of disposing of some of our surplus tar at a reasonable price, while, at the same time, finding employment during the summer months for the winter hands of gas authorities, which has induced me to submit this short paper.

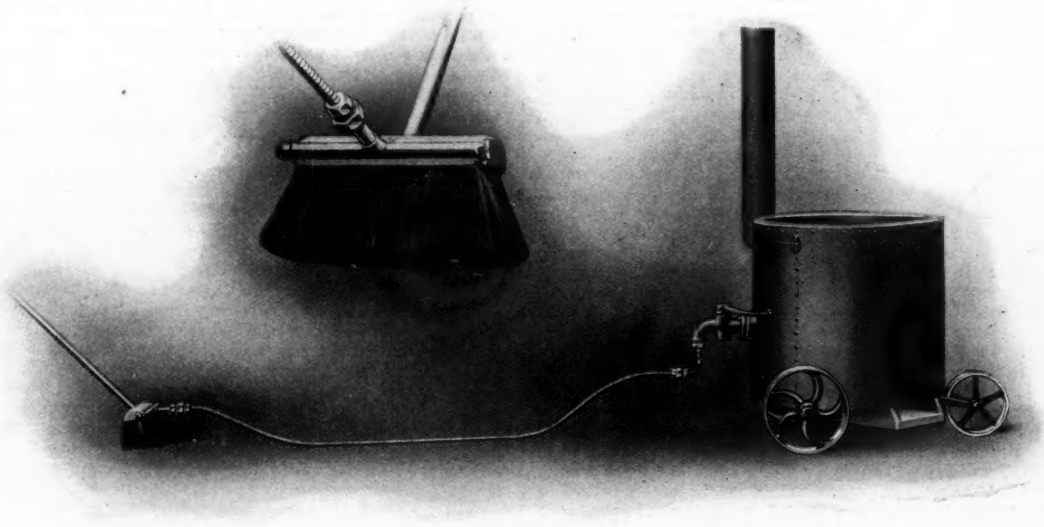
Last summer I advertised that my Company were prepared to give estimates for tar-painting footpaths, drives, and yards; and a circular was sent out giving extracts from a customer's letter for whom I had tar-painted garden paths and the entrance drive to his residence the year before, who said that the original cost of the work had been more than saved in labour previously spent in weeding, raking, and rolling, and, in addition, the paths, &c., were firm and clean all the winter, and he was saved the disagreeable picking-up of the gravel in frosty and wet weather, and the consequent mud and dirt. These paths, &c., had one coating only; and the gentleman was so pleased with it, after twelve months' use, that he gave me the order to give it another coating and other similar work, which has made his paths look like lasting for several years to come. Indeed, there is not a single flaw over the surface after the past severe winter; and the drive has been constantly used. This letter brought me several applications, and close on twenty jobs—varying in amount from £2 to £30 each. I believe satisfaction has been given in every case; and I expect much more similar work this year, which has already commenced to come in.

There are many methods of applying tar for the purpose. The way I commence is to first thoroughly sweep and clean any ground about to be painted, in fine weather, and, if necessary, level-up, and then apply a coating of tar by hand. Cold tar will do very well on hot days; otherwise it is preferable to put it on hot, and sweep it in well, leaving it for a few hours for the sun to shine on, which enables it to penetrate and soak into the interstices of the gravel, slag, or granite surface. It is gone over again with a broom to sweep out any little pools of tar which may form before sprinkling it with granite chippings, slag dust, sharp boiler ashes, or sand, and afterwards rolled with a moderately heavy hand-roller, when the traffic may be forthwith allowed over it. This is a very cheap way of tar-painting for garden paths and drives; and if treated in the same manner with a second coating a month later, they will last for several years.

My experience is that if this kind of work could always be carried out in hot weather, cold tar makes a better job than hot tar, as the sun has greater power for causing the tar to penetrate into the interstices of the material on the road than hot tar will do without the assistance of the sun. Hot tar quickly runs off to the sides; cold tar is gradually absorbed while the sun is melting it. The chief item towards ensuring success is to make sure that every part of the surface gets a good coating, which will effectually make it waterproof, and that there is no caked mud covering the hard material on the roads painted, or it will break up and peel off in a short time. Tar containing water should be dehydrated, as any degree of moisture tends to prevent it binding and setting. It will be readily understood that the best and most lasting results are obtained where the tar has got a good penetration and grip of the underlying material, as well as a good waterproof covering.

Fine granite chippings, or slag chippings or dust, are the best for sprinkling on the painted surface. Sharp sand and boiler ashes sifted through a ¼-inch mesh will also do very well, and make a good surface. If a more pleasing effect is desired for garden paths than the sombre black of ordinary tar painting, a sprinkling of fine Derbyshire spar, well rolled into gravel paths, has a nice effect, as this, after a short time, wears itself bright, and will only add to the cost according to the locality.

The Surveyor to the Newmarket Urban District Council (Mr. Waithman) has recently patented a labour-saving appliance for distributing hot tar. A distributing pipe is attached to the rear of any kind of tar boiler. This feeds one, two, or three brooms with tar by means of ½-inch flexible tubes, each 10 or 12 feet long, which are connected to a perforated piece of pipe fixed on the head of each broom, from which the tar trickles on to the road or path in front of each broom—a man behind manipulating the broom. In this way, two men can cover a quarter-of-a-mile



Showing Reservoir Attachment fixed to an Ordinary Broom. Showing Reservoir Broom connected to Tar Boiler.

Waithman's Reservoir Tar-Broom.

of roadway, 8 yards wide, per day. The flow of tar is easily governed by means of a cock on each feed-pipe. With a small tank boiler for paths, two men (one to attend the boiler and the other to manipulate the broom) can easily cover half-a-mile of 5 or 6 feet wide pathway per day. I have employed it, and believe it to be a useful invention, as it has the advantage of being suitable for either roads or paths. The men are provided with pattens when manipulating the brooms. The attachment can be fitted to any size of tank-boiler, and any reasonable number of brooms can be put on to large boilers for painting wide roads.

The foregoing particulars refer chiefly to drives, footpaths, &c.; but they will also apply to tar-painting main roads, especially newly made-up macadamized roads. I am convinced that tar-painting new roads will greatly prolong their lifetime. A coating every year at a cost of about 1d. per superficial yard on county roads would eventually effect a great saving in the rates, and, in a great measure, cure the dust nuisance. A road coated annually in the manner described becomes more effectually waterproofed each succeeding year, and, consequently, more strongly resists the wear and tear, while adding to the comfort of both users and residents. It is, however, useless to attempt to repair worn-out roads in this way. The best results are obtained on newly-made roads.

Mr. H. P. Maybury, the County Surveyor of Kent, is reported to have stated recently that: "Given another five years with the new methods of construction and repair, road engineers will have met the demands of motors and heavy commercial traffic, and the dust nuisance will be a thing of the past." This is a consummation devoutly to be wished; but I believe, if the experiments at present being carried out all over the country are persevered with, it will be found that tar will be the remedy, and that it will be much more largely used.

The result of the International Road Congress at Paris last year was to recommend tar as the best and most useful commodity for all road-making purposes and dust prevention. In a paper read on this subject, Mr. Maybury, who has had a long experience, is strongly of opinion that the best method of making and fitting up roads for the new traffic is as follows:—

1—Build them up as strongly as possible, reducing camber to a uniform 1 in 30.

2—Coat the surface with the best obtainable hard material, broken to a gauge of not less than 2 inches and not more than 2¼ inches, well rolled and consolidated, only clean hard gravel and chippings being used as the binding material.

3—Well clean the surface and apply a dressing of heated tar or tar compound, covering same with hard, clean gravel or chippings well rolled with steam-roller.

A road made up as above costs about 1s. 6d. per superficial yard, against 3s. with tarred macadam.

There are many other systems of road making which I need not refer to; my object being to draw attention to the undoubted merits of tar as an important adjunct to all kinds of road and path making, and at the same time recommending gas authorities to do all they possibly can to encourage the use of tar for these purposes, by selling it at such a price as will induce county and local authorities to use more of it, and not drive them to the tar distillers to obtain it, as Mr. Maybury, in the paper that he read before the Institution of Gas Engineers in 1907, stated had been his experience.

In conclusion, I may say that I have used tar in very close proximity to all kinds of trees, shrubs, grass borders, &c., and I have never yet found it to interfere in the least with their growth, or to have any detrimental effect upon them.

Discussion.

The PRESIDENT, in inviting discussion, remarked that the paper with which Mr. Troughton had presented the members was a very useful one.

Mr. R. G. SHADBOLT (Grantham) observed that the Borough Surveyor of Stamford was present; and perhaps he might be able to enlighten the members on this matter.

Mr. T. F. R. RYMAN (Borough Surveyor of Stamford) said he had listened with a great deal of interest to the paper. He had used a lot of tar for painting local roads; and he found it very beneficial in reducing the dust nuisance. He could not agree that cold tar was at any time so effective as hot tar. He thought the better way was to boil it about two hours before it was applied; and then to use it and rub it in well. There were machines used in different parts of the country for tar-spraying; and he thought with these they could get a coating of tar for about ½d. per square yard. If the tar was put on by brushes, it cost about 1¼d. Then, again, tar was coming to the front as a binding material for macadam roads. He had experimentally tried a length of road himself; and Mr. West would bear him out when he said that it had answered well. They put down the granite first and then tar and chippings on top, and finally a coating of tar. This made a very successful binding. He was in favour of tar binding; and, in fact, was a great believer in tar for road work generally.

Mr. S. SHADBOLT (Kirkby-in-Ashfield) observed that he had had no practical experience himself of the use of tar for road purposes; but he should like to ask a question or two based upon the experience of the local authorities in his district. In Nottinghamshire, they went in largely for tar macadam, both in the county and in his own immediate district. He was just recently in conversation with the Chairman of their Roads Committee on this topic; and both the Chairman and himself (Mr. Shadbolt) were curious as to how time would deal with the different methods of the county and the local surveyors. The county surveyor, in making tar macadam roads, built up the first section to the needed contour with fine tar macadam, over which, after a little painting, he put a rougher tar macadam about 2 inch mesh, and then again finished off with a finer material. The local surveyor preferred to build up with good rough stone, and cover with rough tar macadam, and top up with fine. In both cases, the surveyors used ready-mixed tar macadam, with a little tar for binding as it was put down, finally rolling well. In both cases, he had noticed that sunny weather would bring out the tar on the surface. It occurred to him that this might have something to do with the mixing. He believed the method generally practised was to boil the tar and heat the metal, and mix them on a heated floor, turning well before being laid.

Mr. JOHN BARTON (Peterborough) said that one novelty that appealed to him in the paper was advertising to do work in the making of private footpaths, garden walks, and such like. He had not heard of this sort of thing being done before by gas-works. With regard to road painting, this had been done in his district for several years past; and he was pleased to say it was growing. Last year they sold no less than 70,000 gallons of tar for road painting. He believed this had given great satisfaction. He did not know what the cost was of doing this work; but as the County Surveyors had continued the system for several years past, he took it that in their opinion it was a good system. Certainly the roads were very good indeed where covered with tar. Motorists would confirm him when he said that they found roads that had been tarred were much better than those that had not been so treated. In his district, the process had gained ground very considerably.

Mr. J. W. AUCHTERLONIE (Cambridge) said, if it was a fair question, he should like to know what price was obtained for tar for road purposes. Some time ago it was stated that 1¼d. per gallon was a reasonable price. He had sold a considerable quantity of tar for the painting of roads; and he had had no trouble in getting 2d. a gallon for it. Mr. Troughton had done a good deal of work; and his balance-sheet showed that it had been a very remunerative way he had devised of selling this residual. In Cambridgeshire, some roads had been treated with tar. These roads were made in the old way with macadam, and afterwards covered with tar. In some places, they had tar tank-waggons, drawn by traction engines. The tar in the tanks was heated by a steam-coil, and a compressed-air pump—also driven by steam—sprayed the tar on to the roads. In this way, they were able to cover a large surface at a low price; and it appeared to him (Mr. Auchterlonie) to be very successful. These tar tank-waggons would take 2000 to 3000 gallons at a time.

The PRESIDENT said he had used tar on garden paths for many years past. They only employed ashes from the ash-pan. They laid these in the open to get thoroughly dry, and then mixed up with tar in the proportion of 10 to 12 gallons of boiled tar to about an ordinary load of ashes. This answered well for garden paths. He had not had any experience of the use of tar for road making. But for garden paths, it answered remarkably well; and they had had repeat orders for this work. They had a large one in hand at the present time. In mixing, the best way was to get 10 to 12 gallons of tar well heated, lay a load of ashes in a thin layer of about 2 to 3 inches thick, and then put on the tar, and mix well. In making paths, a great mistake was made in many instances in not mixing properly. It was necessary to give plenty of time to the mixing; and then with good rolling, an excellent path would result. Some of the members who visited the Leighton Buzzard Gas-Works six months ago would probably remember the long path down to the works. This was laid some 12 years since; and it was only made with the ordinary ashes out of the ash-pans, mixed with tar as he had described. The path had never had anything done to it since, though there was a great deal of traffic over it both summer and winter. It had not even been painted. There was a great deal being done with tar macadam in their district. In Bedford they were doing a lot of it now. Only the previous day when coming from the station, he sold to the County Surveyor 12,000 gallons for simply spraying on the roads. It was being used on the Great North Road; and he was told they would want many thousands of gallons for the purpose. He was sending tar to Fenny Stratford on the Great North Road. The County Surveyor was a great believer in tar; and he was using a considerable amount of it, and, what was of importance in his (the President's) opinion, was buying the tar from the Leighton Buzzard Company.

Mr. H. WIMHURST (Sleaford) said their County Surveyor did not believe in tar; but their late Urban Surveyor made some excellent footpaths outside the town, probably amounting to 6 or 7 miles in length. He made them in this way: He got slag, and heated it. He put up a small furnace for the purpose; and he then applied the tar. He used to make up the asphalt in the winter, and then let it lie four, five, or six months before putting it down. By this means, he obtained a more uniform footpath. If the ballast and tar were mixed and laid down "green," it was all alive; and one could not do anything with it for roads or paths. Neither in summer nor winter was there any trouble from tar exuding from the surfaces of the paths in Sleaford.

Mr. TROUGHTON, in reply, said he was pleased indeed the Borough Surveyor of Stamford was so thoroughly satisfied that tar was likely to become the chief agent in the making-up of roads, as well as for tar painting. In his own opinion, tar as a binding material could not be beaten. County surveyors and road engineers all over the country were experimenting to find the best and cheapest way of making roads. He was not a surveyor or a road maker; but he took up the matter of tar painting for footpaths and drives—chiefly garden paths; and he had found it remunerative work. There was money in it. It enabled one to sell tar at the ordinary sale price of the works; and if interest was taken in the work, a large amount of it could be obtained. Before giving a price for a job, it was necessary to view the ground, because if it was a newly macadamized road, built up in the ordinary way, it would be porous, and it would run away with a considerable amount of tar. In giving an estimate for this kind of work, they had to cover themselves for the first coating; but after a road had been once coated with tar, it did not take much to keep it in a first-class state of efficiency. He believed a well-made macadam road constructed of tar macadam cost practically 3s. per yard; whereas to coat it, it cost the small amount of about 1d. He believed the Borough Surveyor of Stamford put it at about 1¼d. per yard; but he (Mr. Troughton) could do any amount of it for 1d. per yard, and make a good profit. To tar paint a garden path on a day like the one on which they were meeting when the sun was penetrating, and would drive in the tar, one coating (sprinkled with any of the ordinary materials for the purpose, which he believed could be obtained in any district at a reasonable price) could be done for 1½d. a yard, and 1d. for the second one, or 2½d. for the two coatings. Regarding Mr. Shadbolt's inquiry as to the different methods of making up ordinary roads, he (Mr. Troughton) was not, as he had said, thoroughly experienced in road making. He thought, however, Mr. Shadbolt was referring to a system which was described as the Gladwell. It was being carried out in different parts of the country. A layer of small prepared stuff properly weathered was first put down; and this was just sufficiently sticky to bind fairly well. Ordinary clean macadam granite or slag was put on it, and then it was covered with a thin layer of tarred material of a finer nature. The whole was then rolled together, so that the dry middle mixture was driven into the wet bottom layer and into the top cover. This did not cost so much as the ordinary way of making up a heavy road. He believed the system could be carried out at about 1s. 6d. per yard, which was only half the price of an ordinary tar macadam road. But all this showed that tar for road-making purposes was fast coming to the front. Mr. Barton, for instance, could sell 70,000 gallons to his County Surveyor. This sort of thing—orders from county and urban surveyors—was becoming the usual experience. He (Mr. Troughton) charged 2d. per gallon to their county and local authorities; and he tried to encourage the use as much as he could by letting them have it at a reasonable rate. Twopence per gallon was better than selling it to the distillers at 1d. Gas managers should keep this point in view, and encourage the use of tar for road purposes by selling at a cheap rate. He had heard gas managers say they could get 12s. per barrel for their tar. This might be all very well for the time being; but it did not encourage the use of tar for road-making in that particular district. He agreed it was advisable to prepare the material in the winter time if possible, and let it become thoroughly weathered or seasoned. But if they could mix the tar and material up in the shade in the open in the summer, the warm weather would make the tar quickly penetrate the slag. In this condition it was far better for road making. If the stuff was prepared precisely as it was going to be put on to the road, the tar did not get its proper degree of penetration into the material, and it then oozed out in the summer. It was the right thing to have the materials for road making properly weathered. Clean, sharp engine ashes were very good indeed for tar work for garden and public paths. It was unnecessary to spend more than 2d. or 3d. per superficial yard for such paths provided they were made up with gravel beforehand. If frost got into them, the surface only required another coating and sprinkling with sand, and the path would again be waterproof. He did not agree as to the efficiency of the tar-painting machines. These were apt to go over the ground, and leave long stretches of bare patches; and if water got into the road it destroyed the work, more especially in frosty weather. Nothing could beat a hand-painted road, because the hand labour ensured a thoroughly good waterproof in every part.

At the ordinary meeting of the Royal Statistical Society this afternoon, Mr. R. W. Baldwin-Wiseman, M.Sc., will read a paper on the "Increase in the National Consumption of Water." After an historical introduction, the author will refer to the Roman and mediæval water-works, and trace the development of water supply in London, Liverpool, and Manchester, show how the consumption of water has increased with the growth of towns, and urge the necessity for the control of water sources by the State.

We have lately received from the Secretary to the Board of Agriculture and Fisheries an interesting volume of the memoirs of the Geological Survey of England and Wales dealing with the water supply of Kent, with records of sinkings and borings, by Mr. William Whitaker, B.A., F.R.S.; other contributors to the volume being Dr. H. Franklin Parsons, Dr. Hugh Robert Mill, and Dr. J. C. Thresh. After an introductory chapter, the author offers some observations on the geologic formations of the county. These are followed by a chapter on the rainfall of Kent, by Dr. Mill; and then the springs, wallow-holes, intermittent streams, springs, and wells in the county are successively considered. Details are given of various borings for water, and also analyses of spring and well waters. The text is followed by a bibliography, miscellanea, and addenda; and there is a useful index. The book has been published by order of the Lords Commissioners of the Treasury, and it may be had from the Ordnance Survey Office, Southampton, at the price of 8s. 6d.

We have received from John Wright and Eagle Range, Limited, a pamphlet bearing the title of "Heating and Hygiene," which they have had prepared specially with the view of combating the prejudice that has existed among medical men against the use of gas for heating rooms, &c. The author considers the physical and chemical aspects of the question; and, having shown that the best means of warming rooms is radiant heat—in other words, open combustion—he proceeds to deal with the effect of this combustion on the atmosphere of the room and the health of the inmates. He points out that the source of radiant heat must not produce carbonic oxide, and that the heating apparatus used must convey out of the room the carbonic acid it generates. This, he says, is done by the gas-fire, which burns purified gas under perfect conditions of oxygenation and ventilation. The rest of the pamphlet is occupied with observations upon the firm's patent "Simplex" gas-fire interior and "Thermo" gas-fire front, with the introduction of which, it is claimed, "an entirely new departure in domestic heating began." Extracts from speeches, &c., are given to show the favourable opinion now entertained by the medical profession and others in regard to gas-fires; and the pamphlet closes with illustrated particulars of some of those which have been constructed by the firm on the hygienic principles laid down by the author, and fitted with the above-named appliances.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

A Meeting of the Association took place last Friday, at the Cripplegate Institute, Golden Lane, E.C.—the PRESIDENT (Mr. W. J. Liberty) in the chair—when a profitable time was spent in listening to the reading of, and discussing, a paper entitled: "Gas Consumers' Accounts: Avoiding and Settling Disputes." The author was Mr. T. V. FENN, the Deputy Chief Inspector of the Gaslight and Coke Company; and the subject, of course, was one on which he was well qualified to speak. The following are the main portions of the contribution, together with some notes of the discussion to which it gave rise.

CONSUMERS' ACCOUNTS: AVOIDING AND SETTLING DISPUTES.

Mr. FENN, in the course of his paper, made the following remarks:

The subject of my paper is gas accounts disputed by consumers, and how, if possible, to avoid and settle them. The settlement is, as a rule, a very knotty and difficult subject, and is not looked forward to with any degree of pleasure by the officer whose province it is to undertake it to the satisfaction of the company he represents and the customer. There are, of course, a goodly number of instances where the settlement is concluded to the entire satisfaction of the customer; but, on the other hand, there are a great many where the account is paid under protest—thus leaving the customer dissatisfied, which is much to be deplored. I will endeavour to do my best to explain how I deal with customers in this particular branch of a gas officer's duties, with the hope that something I say may assist a brother officer to attain the object he so much desires—viz., the satisfactory termination of a disputed gas account. Perfect harmony should always exist among the staff. This you will always find a most valuable asset both to the officers and company. An inspector must always work hand and glove with the collector, who is more frequently in contact with the customer, and, in consequence, can often offer and give useful hints with regard to his requirements and disposition, and assist in many ways to the ultimate advantage of both.

Now with regard to gas for heating, my opinion is that it is far better to avoid the extravagant use of it than to allow a customer, who per haps has had no experience of how to obtain the maximum amount of heat for the least possible consumption, to go ahead and use his fires in such a manner that when the first winter account is rendered—particularly if the quarter in question has been a dark, dreary, and cold one—it is almost sure to be disputed, and it may follow that no amount of explanation or persuasion will satisfy him. When an order is being taken for a stove, you should use every endeavour to induce your customer to have a regulator fixed, passing just the proper amount of gas required at its fullest capacity —pointing out the amount of waste that may follow, unless one is fixed, if the stove is left to a person who will not take an interest in it, and is heedless as to the surplus quantity of gas used.

In cases where you know your customer's experience with gas-fires is very limited (if any), you should, after they have been in use for (say) a week or two, give him a call, take a reading of the meter, carefully note the consumption, and then make it your business to see the customer, politely ask if the fire or fires are working quite satisfactorily, and state how much gas has been used to date. If in your opinion the amount is excessive, you should inform the customer that the better way to reduce it is by checking the gas by means of the tap at the stove and the main-cock at the meter, or by fixing a regulator at the gas-fire, or any other method that may appeal to you. You must never lose sight of the fact that it is far better to have two satisfied customers of 60,000 cubic feet a year apiece than one dissatisfied at 120,000 feet. Again, a new hand in the use of gas-fires will perhaps have one fixed in a sitting-room used all day. You know what this means, unless a person can thoroughly afford it. It should be your duty to point out to customers that gas-fires, where used in bedrooms, drawing-rooms, and occasional rooms, are economical, and fairly so if used all day in a sitting-room when the saving in labour, &c., is taken into consideration; but if this is not, and the customer goes ahead and uses it constantly, the result at the end of the quarter is generally unsatisfactory both to the customer and the company. This you should in every way try to avoid. It may appear against a gas company's interests, but I assure you my experience is, and has always been, to advise a customer not to use gas-fires, when strict economy is studied, all day long; for as a rule it brings them into bad repute.

I am now speaking of the open gas-fires. By introducing such means of heating as duplex radiators, gas-steam radiators, &c., where all the calorific units are thrown into the room, a very much reduced consumption follows; but where these are fixed in a room, I have always found it better just to leave a window or door a little open and so save steam on the windows.

As you are doubtless aware, cookers and heaters are tested by the makers at about 15-10ths pressure before leaving their works—this being the point at which they obtain the best result from a heating and economical point of view; and you can imagine what follows when the stoves are fixed in districts where the pressure may run up to 45-10ths. Pressures now are generally not lower than 25-10ths, for which we offer up thanks. I consider low pressures are much to be deplored, and should not, if it can possibly be avoided, exist. An inspector can always arrange to reduce pressure by means of the main-tap, &c. I recollect a case where a customer had two canopied gas-stoves fixed, of the old type; and when the account was rendered for the quarter, he asked me to call and explain the large registration. I found the stoves going full-speed ahead, with the main-tap full on, and the consumption per stove about 70 cubic feet per hour. They were canopied stoves, and the waste was not noticeable unless you went on your knees and looked for it. This is a form of stove that you should pay particular attention to in seeing that regulators are fixed. Gas-fires in grates are not quite so liable to extravagant use, as the flames can easily be seen above the fuel. To this the customer's attention should always be drawn, with advice to turn down the tap, after the asbestos appears incandescent, to such an extent as to just keep it so. I have always found the "Blenheim" type of fire give good results, particularly where a special back is fitted, and the duplex arrangement. The former gives great economy by saving and deflecting a large amount of radiated heat into the room which otherwise would disappear up the flue. When fitting up apparatus, at all times make quite certain that the gas supply is sufficient to render it thoroughly efficient; and also see that the apparatus selected is quite suitable for the work required of it.

Governors on cooking-stoves, particularly in private houses, I do not consider so necessary, because an excess of gas, and consequent waste, are easily detected, because an excess in the oven spoils the goods therein, and an excess on the hot-plate spoils the boil and causes an unpleasant smell through the flames burning outside the saucepans. All this should be explained to the person who uses the stove. Of course, a good governor with an outlet pressure of (say) 16-10ths to 18-10ths fixed on the feed-bar is a grand economizer; but the great difficulty is to get a customer to go in for the extra expense, though the governor soon pays for itself. A similar result is brought about by a careful customer turning on the gas to the required height. But, unfortunately for themselves and the company, they are few, and the stove gets blamed as an extravagant means of cooking, whereas it is really miles in front of a kitchen-range for economy.

In cases where in large establishments there appears to be a likelihood of gas being turned out on account of the wastefulness of the cook, by all means at once arrange to fix a governor; but be careful not to reduce the pressure on the outlet too much at first. Drop down gradually to 16-10ths or 18-10ths; for where the cook has been in the habit of using gas at a pressure of 25-10ths to 30-10ths, or perhaps more, the difference in the rapidity of heating, &c., is very marked.

The use of gas for hot-water circulation should be carefully thought out; and great care should be exercised in studying how to produce a cheap hot-water supply. In many large houses I have been successful in introducing gas entirely for cooking, solely on account of fixing a cheap and effective hot-water supply by means of a coke circulating-boiler attached to the existing flow and return. This may seem contradictory to our interests, though we supply coke; but I can assure you that in every case except one a coke-circulator has brought about the use of gas entirely for cooking, and the subsequent abolition of the kitchen-range. You will very likely think to yourselves, "Why not have introduced a gas hot-water circulator?" Well, in large and very lofty houses, and where an immense amount of hot water is required, gas is too expensive. Besides, the loss of radiated heat through the flow and return pipes being such a length is enormous; and in these cases it means a coke-circulator and a gas-cooker, or else a continuance of the old system. Gas for the modern flat and a two storey house, for hot-water circulation, is effective and economical, and should be pushed for all it is worth. But the customer should in every case be advised how to use it with economy; and where an installation is in its infancy, a call now and then should be made, a reading taken, and, if the amount is excessive, the user should have his or her attention drawn to the fact, and every means be employed to have the circulator used with discretion—such as governing the supply to the correct amount required, fixing a thermostat, &c. A little extra trouble about this time will save you a heap later on, and often a customer. The automatic shut-off is an excellent means of effecting a saving in cases where a customer cannot, or does not, give personal supervision; but even this wants explaining, because a reduction to (say) 10 feet per hour going 24 hours a day means a good amount at the end of the quarter.

In cases where a customer is dissatisfied with a gas-circulator, and suggests going back to the range, which means a loss of consumption on account of the cooking-stove being partially thrown out of use, my advice is to fix a small coke-circulator, effecting economy at once and saving the situation. If the customer has doubts of its efficiency, fix it up on approval; it is worth the risk. Tell the consumer how nice it is to be able to burn up all the refuse, and that the outside cost for fuel will be about 2s. to 2s. 6d. per week, which is a fact. Do not fix up a gas-circulator where you feel instinctively that the cost of producing hot water will bring gas into discredit; but go for a coke-circulator and a gas cooking-stove. Some large gas hot-water installations have been fitted up with Potterton's gas-boilers; and for producing hot water under certain conditions califonts are satisfactory and economical. We have also had considerable success with the Wilson's circulator, but find it most useful in flats or houses of one or two storeys, where the head of water is not excessive.

While I am on the subject of hot water, I should just like to

point out how, with a reduction of pressure, the quantity of gas consumed is reduced also.

Two Quarts of Water in an Ordinary Kettle on a Cooking-Stove Starting at 56° Raised to Boiling Point at the Following Pressures.

18-10ths.	..	5·30 feet.	..	18½ minutes.
10-10ths.	..	5·09 ,,	..	24 ,,
6-10ths.	..	5·07 ,,	..	29½ ,,

This goes to show that where water is not required to be heated suddenly, it is, within reasonable limits, much more economical, as far as gas in concerned, to boil it slowly; but where you have a case in which a burner passes 150 feet per hour at (say) about 30-10ths, and is adjusted to pass 80 feet at 10-10ths, the waste would be much more apparent.

While we are on this subject, another case may interest you, which illustrates the wastefulness of long tongues of flame for heating water, &c. A badly-constructed imperfectly-adjusted gas-burner, consisting of a piece of barrel with an elbow turned up at the end, was found to consume 63 feet per hour and take 25½ minutes to do certain work; with the tap turned down, the time was reduced by one minute, and the consumption by 8½ feet; and with a Fletcher concentric burner of the "Standard" variety, full on, the time was reduced to 20½ minutes, and the consumption 50½ feet, which would have been reduced still further if the pressure had been broken down from 23-10ths to 10-10ths—the latter being the pressure Fletcher burners are regulated to. There is no doubt that the proper way is to cut up a flame into a multitude of units, and for the blue points to be just in contact with the bottom of the vessel, without breaking up the inner cone. In a similar case I found there were being used about a dozen Fletcher drip-proof burners for melting purposes, with very poor results and a large gas consumption. I suggested special burners with small gaps to them, and was asked to get some made. Fletcher's made them, and the result was splendid. They reduced both the time and quantity of gas used very considerably; and they were introduced to the firm's other factories.

The system of employing lady demonstrators to visit houses where cooking-stoves have been newly fixed is a very excellent one; and I am pleased to say that the public appear now to fully appreciate it. Means are afforded thereby to give the household a practical demonstration of how to use the cooking-stove with economy and ease, and to the very best advantage. I feel sure that a visit from the lady demonstrators often saves a disputed account at the end of the quarter. With regard to the settlement of disputed accounts, the personality of the officer is, and always will be, a very big factor. He should have a forcible and convincing manner, plenty of energy, resourcefulness, perseverance, and patience; and joined to these qualities there should be unfailing and invariable courtesy. He should be capable of explaining and addressing customers on all questions appertaining to gas-meters and gas affairs, which can only be brought about by constant practice and his always taking great interest and pleasure in his business. In fact, he should have just those qualities that go to make an excellent commercial traveller, without which it is very difficult for an outside man to be a success. An inspector should cultivate the art of how to please his customer and how to favourably impress him with his desire to be fair and just, and endeavour to let him see that he is taking every possible interest in the question of the moment—that is, the disputed gas account.

We will take it that a complaint has arisen when the customer cannot, so he says, account for the registration; and the question arises, What is the best way to go about the settlement to the satisfaction of the customer? You should first go carefully through your index-book, see if he has made any additions to his account, such as heating or cooking stoves, compare the account quarter by quarter, and note all increases or decreases. In the event of a change of meter having taken place recently, since when, without any apparent reason, the account has increased to a large extent, you should inquire if the starting-index has been correctly recorded; and, if this is so, find out the result of testing the old meter. If slow, it will at once give you something to work upon. You will see the head of the house, and listen attentively to his statements, and then exhaust all possible means of obtaining a reason for the increased consumption. Firstly, it will be advisable to read the meter and check it with the meter-card and book, and work out the consumption per day during the quarter, pointing out (if it is so) that the consumption since has gone down to normal, and that he will probably find his account for the next quarter almost the same as the corresponding one. Then ascertain if there are any outside pipes that may at times be turned off from the house, but at others on; and, if decayed, a leak during the time may be the cause of the increase. After this, test the fittings by a test dial, first ascertaining if all the lights, &c., are turned off. This will readily tell you if the fittings are sound. After this, carefully go through the house, and should you find extravagant flat-flame burners in passages, advise No. 2 incandescents with regulators; or if the consumer objects, as he sometimes will, on account of draughts, get him to let you fix regulated flat-flame burners. In fact, go through the premises generally, and advise him, wherever you see waste going on, to let you make an alteration. Explain the exact amount of gas to use in oven and on hot-plate; get him to let you fix regulators to the heating-stoves; and do everything that is possible to effect a saving without causing any discontent. But do not in any way question the correctness of the meter, unless you feel that the consumption cannot be satisfactorily accounted for. The inspector should post himself up with figures referring to the temperature during the quarter in question and corresponding ones, and show the consumer how the output has increased whenever the temperature has fallen, and bear in mind the difference in the atmospheric conditions generally. In fact, he should be tactful and watch for a fitting opportunity to get a few words in that may throw some light on the increase.

A man who just reads the index to verify the quarter's reading, tells the customer that it has been correctly read, and suggests that the only course for him to pursue is to get it tested, makes a great mistake, and should at once be put into the right way of going about this very important part of the company's business. The inspector should bear in mind how very few meters that are tested prove fast, and those only a little over the amount allowed by the Act—viz., 2 per cent.—which proves very unsatisfactory to the customer. He is generally disappointed with the allowance, and in consequence more than ever prejudiced against the company. Of course, there are times when it would be necessary for you to advise the consumer to have the meter examined; but this seldom happens. Some very curious mistakes have occurred at times, but fortunately very seldom; and where no possible reason can be assigned for an abnormal consumption, the index should be specially examined. If you will refer to the report of the Official Meter Tester published recently in the "JOURNAL OF GAS LIGHTING," you will find that defective meters are by no means in favour of gas companies.

Going back again to disputed accounts and how to effect a saving when rendered more than ever necessary on account of a consumer threatening to introduce electricity for lighting, I will tell you how I dealt with a case. A large block of flats had had a very tempting offer from a certain electric company to fit up free of charge and light at an amount which came to about half of what we were doing it for—*i.e.*, staircases and corridors. I saw the secretary, who promised that if we could undertake to reduce the gas consumption to half, and light the place satisfactorily, he would make no change. I had pressures taken, and found them average between 35-10ths and 40-10ths. The "C" burners were passing about 7 feet of gas per hour each. I had these all done away with, and No. 2 Kern burners fitted instead, with injectors regulated to 35-10ths to 40-10ths. All the staircases were fitted with pneumatic distance lighters; and the corridor—150 yards long—was arranged with a bye-pass service and mercurial seals, so that at night time, whichever entrance a resident came in at, the porter could light up that section from his box, and the staircases at the foot of each staircase. This brought about the desired result, and we retained the account, though in a reduced form.

In conclusion, it is a good plan to listen very carefully to the consumer's story if he is inclined to talk. In all probability he will contradict himself or give you a point or two to fasten on to. Where servants are kept, be careful not to throw blame indiscriminately on them. Sometimes a servant can be made use of to contradict her mistress in a perfectly innocent manner. Advise your customers, where you consider the meter too small, to have a larger one fixed. Tell them that the meter is over-worked, and it will certainly be to their advantage to have one of larger capacity.

Discussion.

The PRESIDENT remarked that they had the privilege of the presence of one of their patrons—Mr. Pilbrow; and they would like to hear a few words from him. He had had a very large experience, following on the same lines as that of Mr. Fenn.

Mr. E. PILBROW said he did not think he could add anything to what the author had told them. He himself had had many years' experience with the Gaslight and Coke Company, and this agreed entirely with the views put forward by Mr. Fenn.

Mr. F. AINSWORTH remarked that no one could have written such a paper as that they had just listened to, unless he had had a great amount of experience. The author had touched upon almost every phase of the question of disputed accounts. There was no doubt that a great deal of care and skill was needed in dealing with these complaints. Often difficulties arose that were not easily put on one side; and in some cases weeks expired before they could be satisfactorily adjusted. The paper was out of the ordinary line; but it dealt with a subject that was of the greatest importance to every gas company. Mr. Fenn had made some remarks with reference to pressures—saying they ought to be kept up. Take a place where competition was very keen, there was no doubt that if they only had the pressure gas would stand a fair chance; but there was no inspector who could give the satisfaction he would like to, unless he had the pressure at his command—especially when there were houses with perhaps nothing larger than ¾-inch pipe. On the other hand, they would find that, if the pressure was too great, heating stoves were in most cases too expensive, unless they were fortunate enough to come across consumers who knew well how to look after the tap. Mr. Fenn was careful to recommend that every endeavour should be made, when taking an order for a gas-stove, to induce the customer to have a regulator fixed. He (the speaker) had yet to be converted to governors for general use, though there were certain places where he did recommend them. But whatever was done, they wanted a simple means by which a consumer would know at once what to do to keep his consumption down. Perhaps Mr. Fenn would give his definition of governors. A case had come under his notice in which the electric light people were

offering to supply a large building at 2d. per unit, though they were charging generally 3½d. But in spite of competition of this character, gas was holding its own, and the electricity people would have to do much more than they had already done before they would keep it out altogether. He had not had a great deal of experience with regard to circulators; but he was sure Mr. Fenn was right in the advice he gave on this subject.

The PRESIDENT remarked that the author had given them his life experience of the working outdoors of a great gas company. He had touched on most of the things it was necessary for them to know if they wanted to see their output go up. In addition to this, he had given them valuable information with reference to fires, cookers, radiators, hot water supply with coke circulators and other kinds of apparatus. He had devoted quite a long time to the question of pressures; and he had given them any amount of information which would enable them to speak intelligently to their consumers when they called upon them. Then he had given them his experience of escapes, and how to detect them; and his instructions to inspectors might be called a complete guide to the outdoor man. Very helpful were his remarks on how to retain customers under keen competition, and his advice with regard to calling on consumers and teaching them something of the uses and misuses of gas. He referred to the lady demonstrator doing this; but she had only a limited amount of time at her disposal, and an unlimited number of consumers to call upon. Consumers rarely saw a lady demonstrator, because there were so few of them appointed. Therefore the inspector had in a great measure to take her place; and if he could put in a pithy and intelligent way all the points with regard to gas heating and cooking, he would do much good. For many years, he (the speaker) had been advocating the use of higher pressures for gas; and he was very pleased to see the author of the paper was of the same opinion. This was not merely coming, but had come about; and they were now getting gas at very much higher pressures than was the case formerly. There were some who thought this was a bad thing; but Mr. Fenn had pointed out to them that an inspector could always arrange to reduce the pressure by means of the main-cock, &c., while the consumer could turn the taps partly off when a full supply of gas was not needed. Therefore, he felt convinced that they were right in asking for these higher pressures. He had been very pleased to see the Deputy Chief Inspector of the Gaslight and Coke Company with them that evening. They had expected a treat; and they had not been disappointed.

Mr. P. E. CULLING said it appeared to him that inspectors were already working very hard indeed; and considering that they had such a large number of consumers to look after, and that as each week went by so many new appliances were being fixed, it seemed almost impossible to him for them to carry out their work in the manner Mr. Fenn had mentioned. He thought that if companies kept in close touch with their consumers, in the same way as the electricity people did, by means of correspondence, showing the advantages that could be gained by using appliances in a certain way, this would prove of great assistance to the inspectors. As to a meter in use that was considered too small, was it a fact that it was to the advantage of the consumer to have it changed for a larger one?

Mr. FENN, in replying to questions that had been put, said that when he was speaking about a regulator, he did not, of course, mean a governor. He referred to the regulator which was fixed by the stove for the purpose of regulating the amount of gas passed. That was to say, supposing a stove should pass 14 cubic feet per hour at a pressure of 2 inches, the regulator would not allow it to pass more than this quantity. This was his idea of a regulator. They had found in many instances where accounts had been excessive that first-class results were brought about by the introduction of a governor at the meter and a regulator at the stove. He had a case on hand now, where, by the introduction of a Stott's governor, and a regulator here and there, and also a check meter for the cooking-stove (which was a regulator against the servant), they had brought the consumption down by just one-half. Mr. Culling had referred to inspectors having already such a superabundance of work that it would be impossible, however much they tried, for them to bring about the results he had spoken about in his paper. Well, if the inspectors had already so much to do, it was, of course, impossible for them to do as he had recommended, and he had no more to say on the matter. But every inspector should to a certain extent work "off his own bat." He had a district given to him, and he did not want to wait for instructions right and left. He should regard his district in a sense as his own shop; and the best thing for him to do was to get hand and glove with his customers. When he was in charge of a particular district, he always found it the proper thing, wherever he could, to wait on the consumers—at any rate, those who had appliances of any size. Where a district was increasing by leaps and bounds, it would be impossible to do this; but in a place like London, where the areas were to an extent already filled up, it was different. If a man had a district, and he found he could not work it to the satisfaction of the consumers and the company he served, he should go to his superior officer and put the matter fairly before him, when he would always get the necessary assistance. As to whether it was to the advantage of the consumer to have a meter changed that was too small, he could only remark that it gave a customer satisfaction to have one which was the right size for his requirements.

Mr. J. HEWETT, in proposing a vote of thanks to Mr. Fenn, said the paper had been extremely instructive to them. Anyone who required a lesson in tact (which was one of the most necessary qualities to possess nowadays), should certainly call upon the author. In the paper there was a reference to some "C" burners consuming 7 cubic feet per hour. He had been surprised to hear that any such burners should have been fitted up and allowed to be in use. They knew, however, that people did tinker about with these things occasionally, and one could not always be behind their backs; so probably in the instance alluded to, someone had been trying to make the burners do better than they were really intended to. He was sure they would all be glad to see Mr. Fenn again on some future occasion.

Mr. T. F. CANNING, in seconding the proposal, said they had all been impressed by the paper. Twenty years ago, before electricity became such a severe rival, managers easily settled their disputes by cutting off the supply of gas; but Mr. Fenn advocated the more modern method of dealing with the consumer with tact and judgment and courtesy. This was the plan that was successful in the present day; and the old system of cutting off the supply was obsolete. They were all deeply indebted to Mr. Fenn for the generous manner in which he had given the members of the Association the benefit of his long experience.

The vote of thanks was carried with applause; and Mr. FENN briefly acknowledged it, remarking that it had been a pleasure to him to read his paper.

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

The Annual General Business Meeting of the Western Division of the Association was held in Glasgow on Saturday—the PRESIDENT (Mr. A. H. Whitelaw) in the chair.

ELECTION OF OFFICE-BEARERS.

The first business was the election of office-bearers, with the following result:—

President.—Mr. D. Currie, of Stirling.
Vice-President.—Mr. J. Fraser, of Provan.
Hon. Secretary and Treasurer.—Mr. D. Fulton, of Dawsholm.
Members of Council.—Messrs. R. Smith, of Dawsholm, W. M. Mason, of Glasgow, J. Mann, of Glasgow, D. Irvine, of Kirkintolloch, and F. L. M'Laren, of Dumbarton.

HONORARY MEMBERS.

The PRESIDENT intimated that the Council had elected as honorary members of the Association Messrs. G. R. Hislop, of Paisley, James Lowe, of Auckland, and J. W. Napier, of Alloa.

Mr. J. FRASER moved a vote of thanks to Mr. R. A. Campbell for the manner in which he had performed the duties of Hon. Secretary and Treasurer during the latter part of the session.

This having been agreed to, Mr. CAMPBELL briefly acknowledged the vote.

LECTURE BY MR. O'CONNOR ON SUCTION-GAS PLANTS.

The PRESIDENT, in calling upon Mr. Henry O'Connor, F.R.S.E., of Edinburgh, to deliver a lecture on "Suction-Gas Plants," said Mr. O'Connor did not need any introduction to the members, as he was known over the length and breadth of the land, and most of them would have seen that he had recently been delivering a series of lectures in Edinburgh.

Mr. O'CONNOR said: That suction-gas plants have proved a strong competitor of the older method of supplying internal combustion engines with coal gas is most certain, and therefore the few notes I have put down regarding this, and propose to give you, may not prove uninteresting. The gas-engine is generally required during the day, when there is the lowest consumption for other purposes; and consequently the gas-mains are lying comparatively unused, and any apparatus which gives them employment is to be encouraged. On this account, many companies and corporations are prepared to supply the gas so required at considerably reduced rates. The Commercial Gas Company, of London, offer the following discounts from their standard prices, per 1000 cubic feet: When the accounts exceed £100 per annum, 10 per cent.; above £100 and not above £150, 12½ per cent.; above £150 and not above £200, 15 per cent.; above £200 and not above £250, 17½ per cent.; and above £250, 20 per cent. In this way, they have built up a business which is equal to a million cubic feet per day for such power purposes only. The cost of collection per 1000 cubic feet is reduced when such large accounts are obtainable; and in every respect there are advantages which fully warrant the reduction in price. Many small gas-works can, with advantage, offer such inducements, especially where there is a reserve of manufacturing plant, even though the holder room is not excessive, as such gas goes out practically as it is made—merely passing through the holders. There are many advantages to the consumers in the use of the richer gases, with their higher calorific value, as, of course, it is the latter which is of interest for such purposes. Not the least of these is that the gas is better purified, and will not therefore foul the inside of the cylinder, nor, if magnetic ignition be used, the sparking points. The engine will also have more power with coal gas, owing to the fact that the gas is under pressure, and not suction, as it enters the cylinder. This alone equals a loss of 10 per cent. in the power given by a suction-gas engine, as against one using pressure gas. The smaller area of the air-inlets with-

draws the air when the governor has closed the gas-port; and thus a further 4 lbs. suction is made in the cylinder, which means a loss of some 5 per cent. more as against the coal-gas supply. With coal gas, the engine will start away at any time; and, in fact, this is frequently taken advantage of, as coal gas is generally connected to the engine, for starting or breakdown purposes. This has been done so frequently in Edinburgh, that the Gas Commissioners will not supply meters where a suction plant is installed; and if coal gas is required for the purpose, the consumer has to provide his own meter.

The nature of the gases is also of importance. As certain combustible gases, such as CO, will allow of higher compressions in the cylinder, without pre-ignition, than will H and O, the proportions of these two gases are of much more importance. The compression pressure in a gas-engine governs the explosion pressure, as the latter is in direct proportion to the former. If we consider that there is 18 per cent. of H in suction gas, as compared with 53 per cent. in coal gas, we shall have in the cylinder, when the due proportion of air has been mixed with each, a larger proportion of H in the suction gas—viz., 12 per cent.—as compared with only 5·3 per cent. with coal gas. This causes a reduction in the power obtainable from the engines of from 20 to 25 per cent.

The question of the incombustibles in the two gases, as mixed with air in the cylinder of the engine, must also be considered, though this is not a very large matter. With producer gas we shall have (say) 68·7 per cent. of CO_2 and N; and the amount required with this gas will bring with it its proportion of incombustible nitrogen, so that there will be some 72·7 per cent. of incombustibles in the mixture. With coal gas, with 4·3 per cent. of CO_2 and N, 9·25 times as much air can be employed; and the nitrogen in this only brings the percentage of incombustibles to 70·2. With some gases, however, the difference in the proportions would be greater.

We may profitably compare the making of gas by different processes, and we shall thereby learn some useful lessons. We should, perhaps, best take them in the following order: Producer gas, as made in the Siemens producer; mixed producer and water gas, by the Dowson and suction-gas plants; and water gas, by the Dellwik-Fleischer blue water-gas plants and also by the carburetted water-gas plants on the Lowe system.

We may at this point look into the methods of manufacture of the various gases used for power purposes. I need hardly go into the making of coal gas, as I take it you are all familar with at least the general routine followed. We may, however, consider it as consisting of (say)—H, 53 per cent.; CH_4, 37 per cent.; CO, 5 per cent.; CO_2, 0·7 per cent.; N, 4 per cent.; and O, 0·3 per cent. I will therefore commence with the manufacture of producer gas proper. This consists of the partial burning of the fuel in the producer furnace, so that the carbon is only converted into carbon monoxide by the limitation of the primary ingoing air. This is exactly the same as is done in a regenerative furnace for heating gas-retorts. A small quantity of CO_2 is made at the bottom of the bed of fuel, which serves to keep this hot, but is converted into CO by the addition of a further proportion of C—thus: $CO_2 + C = 2CO$—as the gas passes up among the deep bed of hot fuel. The gas issuing from the producer thus consists of CO and N. This CO combines in the engine with a further proportion of O, and when compressed and exploded yields CO_2 and N. In this producer plant, without steam, the theoretical composition would be CO 34·7 per cent. and N 65·3 per cent. by volume; and this would have a thermal value of 118·8 B.Th.U. A practical test with coke containing 92·7 per cent. C gives a composition of the gas as follows: CO_2, 2 per cent.; CO, 29·4 per cent.; H, 1·90 per cent.; N, 66·7 per cent. A pound of carbon thus produces, theoretically, 10,190 B.Th.U.

The next gas is the producer gas and water gas from steam, both made together in one producer. In this case, the air, passed up through the bed of fuel, is accompanied by a quantity of steam, made in a separate boiler, and generally used to inject the correct amount of air at the required pressure. In this way the products consist of CO_2 from the gas used to keep the fuel hot; CO from the combination C and O; H from the steam; CH_4; and N. The plant consists of a producer, seal-pot, coke scrubber, sawdust scrubber, and gasholder, together with a boiler to generate the necessary steam. The mixed products would, theoretically, have a composition of: CO, 39·9 per cent.; H, 17 per cent.; and N, 43·1 per cent., with a calorific value of 195·6 B.Th.U per cubic foot. The Dowson pressure plant, when using anthracite, gives a gas containing CO, 27·6 per cent.; H, 15·3 per cent.; CH_4, 1·4 per cent.; CO_2, 3·9 per cent.; and N, 51·8 per cent. The theoretical produce of 1 lb. of carbon by this process is 14,580 B.Th.U.; while the practical result with gas, as above, is 13,285 B.Th.U.

Suction gas is very much of the same nature, as it results from the use of steam and air; but the proportion of the former is less. The plant consists of a producer, which contains a vessel for water which is heated by the fuel in the producer, a seal-pot to prevent the return of the gas, and a coke-filled scrubber. The air, drawn in by the partial vacuum in the gas-engine cylinder, passes over the heated water, and is thus saturated with the quantity of water vapour which it can carry at the temperature to which it is raised. The making of the gas is thus intermittent, as it only takes place for a fourth of the period, as with the Otto cycle the suction stroke forms only a fourth of the complete cycle—in other words, for half-a-turn of the axle every second revolution of the same. Suction gas does not give such a high heat value as pressure gas, as it only shows, theoretically, 12,565 B.Th.U. per pound of carbon, and has a composition of (say) CO, 25 per cent.; H, 8·4 per cent.; CO_2, 4·4 per cent.; N, 61·8 per cent.; and a calorific value of 129·83 B.Th.U. per cubic foot. When made on a practical scale, the composition is CO, 19·97 per cent.; H, 15·93 per cent.; CO_2, 7·16 per cent.; O, 0·51 per cent.; and N, 55·14 per cent.

When we make water gas alone, as in the Dellwik-Fleischer system, we have a periodical forcing in of air to convert the fuel to CO_2 for the purpose of bringing it to the proper heat (say, 1000 C.) for dissociating the H and O of the steam, and then the closing off of the air and the steaming of the fuel to make water gas. By converting the fuel to CO_2, we get a shorter period of blowing and a longer one of steaming, and a conservation of the heat contained in the coke or other fuel used to provide the carbon. Thus during the "blow" the gases made are usually CO and N, with the heat retained in the producer, except that which passes away with the products of combustion and the N. If an illuminating gas is required, it is usually obtained by the evaporation of benzol, which gives the otherwise blue flame its illuminating effect by the addition to it of the necessary hydrocarbons without much heat for the evaporation. Taking the blue water gas as made in the Dellwik-Fleischer plant, we have a theoretical product of 14,301 B.Th.U. per pound of C, if no heat were required in the formation; while the practical result is only 10,990 B.Th.U. The theoretical composition is: CO, 50 per cent.; H, 50 per cent., or 344·5 B.Th.U. per cubic foot. The practical result, in working, gives a composition of about H, 51 per cent.; CO, 42 per cent.; CH_4, 0·5 per cent.; CO_2, 4 per cent.; and N, 2·5 per cent.—with a heating value of 318·7 B.Th.U. per foot.

Mond gas is made in its complete form only when some 4000 H.P. and upwards is required, as the full process is only economical on a large scale. This process uses a much greater quantity of superheated steam than other water-gas plants, so as to prevent the ammonia becoming decomposed. The ingoing air and steam are both warmed by the heat of the gas made. The plant consists of a producer, a superheater of the steam and air, a water-scrubber, and an acid-tower, which serves to remove all traces of ammonia, and is usually supplied with 4 per cent. acid, afterwards used for the manufacture of sulphate of ammonia, of which 1 ton is obtained from each 28·5 tons of coal used (this includes the coal used in the providing of the necessary heat). About one-fifth of the heat is obtained by the regenerative principle above described, so that there is not so much loss of fuel as might be supposed. Taking Mond gas as having a composition of: H, 24·8 per cent.; CH_4, 2·3 per cent.; CO, 13·2 per cent.; CO_2, 12·9 per cent.; and N, 46·8 per cent., we have a calorific value of 154·6 B.Th.U. per cubic foot, with a percentage of combustible gas of 40·3.

Coming to the water-gas plants, the one best known in this country is the Lowe, in which the first operation is the blowing-up of the fuel by the forcing in of air at about 9 inches pressure, through the fuel; only such an amount of air being admitted as will form enough CO to be used in the next two vessels, with a further supply of air to each to form CO_2, and thus heat the chequer brickwork contained in the vessels. It will be easily seen where the great difference lies between the blue water-gas production and that where oil has to be carburetted, as the heat generated in the producer is used only to heat the fuel itself. In the carburetting plant it has to heat the carburettor and superheater contents, and make these of a cherry-red heat, for the purpose of converting the oil into gas in the former, and of fixing the same, in combination with the blue water gas made in the producer. The plant has a producer, carburettor, superheater, oil-heater, seal-pot, scrubber, and condenser. When the air is shut off at the end of the "blow," steam is injected under the fuel bed and forms water gas, which then passes to the carburettor and superheater, and thence to the oil-heater, seal, scrubber, and condenser. Such a gas has a net result, theoretically (when making blue water gas only, without taking into account the heating value of the oil), of 8778 B.Th.U. per pound of carbon; but practically only 8489 B.Th.U. are obtainable, with a composition of: H, 48·6 per cent.; CO, 44 per cent.; CH_4, 0·4 per cent.; CO_2, 3·3 per cent.; and N, 3·7 per cent. It should be mentioned that the theoretical B.Th.U. have all been calculated without taking into consideration the heat losses by radiation, convection, and heat of exit gases.

We might also examine into the quantity of air which each of these gases will require for complete combustion, though when used in a gas-engine more than this proportion will be required to ensure that all the gases are utilized during the short time the explosion is taking place, as I need not remind you this occurs only during one-fourth of the time the engine is running.

With one cubic foot of the following gases, the quantity of air required is—

	Cubic Feet.
Producer gas	0·74
Dowson gas	1·15
Suction gas	0·84
Mond gas	1·11
Dellwik gas	2·26
Blue water gas from carburetting plant	2·24
Coal gas	4·90

As a matter of fact, whatever gas is being made, the number of heat units in the mixture in the cylinder is practically the same—viz., 70 B.Th.U. per cubic foot—the remainder of the gases being non-combustible. Of course, with a pure gas, such as H or

CO, and a diluent of pure oxygen, we should get the maximum efficiency from our engine, as then the products would be H_2O and CO_2; and there would be no N in them to be heated up and to carry away this heat without any useful effect. Where air is used, this N will accompany the O in the proportion of 79 per cent. by volume of the whole. Therefore we shall always have this proportion of non-combustible gas in our cylinders; but the less of it there is and also of CO_2, the better for the heat and efficiency of the engine.

We can therefore compare our fuel gases on the basis of the proportion of combustible and non-combustible gases in the absolute mixtures found in the gas-engine cylinders; and we shall find as follows:—

Gases.	B.Th.U.	Air Required to equal 70 B.Th.U.	Percentage of N, and CO_2.
Producer	115·0	0·64 × 68·7	72·7
Dowson	163·0	1·33 × 55·7	69·0
Suction	129·8	0·85 × 62·3	70·0
Dellwik	318·7	3·55 × 6·5	63·0
Mond	154·6	1·21 × 59·7	60·2
Carburetted water gas	323·5	3·62 × 7·0	63·4
Coal gas	600·0	7 57 × 4·3	70·2

Some notes as to the practical working of two 60 H.P. suction plants I have had under observation for some time may be of interest.

First, as to the starting. This is frequently a difficulty, unless coal gas is connected up; though it is generally stated that the engines can be started within twenty minutes of the fire being lighted. I have known many occasions when the men have had to be sent home until after breakfast time, owing to the delays in starting. The trouble is largely due to the fouling of the points where the spark is made by the magnets; and these always require heating before starting. To obviate this trouble of starting, it has been found necessary to keep the engines running light during all meal hours. Although there is little work to do in charging the producer, it is found necessary to keep one man in constant attendance. The amount of fuel required is 1 lb. of anthracite—at, say, 17s. 6d. per ton in Edinburgh—for each horse power. For a period of 1235 hours, this equals 61 lbs. per hour for a 60 H.P. gas-engine.

Water is required for the generation of steam. It is important that there should be sufficient of this, but not too much, or heat will be wasted in heating it to bring it to the temperature of the ingoing air to saturate it. There is also required a constant supply to the coke-scrubber; and the overflow of both runs into the seal-pot, and thence to the drain. In nearly all works water is being used in varying quantities for other purposes. This causes a variation in the rate of supply to the suction plant; hence the need of the man's constant attendance to regulate the flow of water to it.

The scrubber, which is filled with ordinary gas coke to pass through a 2-inch ring, is a cause of trouble in a short time, as every month, or perhaps every two months, it has to be emptied, owing to a heavy deposit of tar all over the surface of the pieces of coke. It is curious that this material (coke) is used for the filling of the scrubbers, when it has been long proved that it is unsuitable for scrubbing gas, and other fillings, such as boards on edge, have been adopted in nearly all gas-works, owing to the clogging of the coke if any tar came forward. Probably the desire for cheapness of first cost, and the competition among makers, prevents the adoption of boards, which would undoubtedly be more expensive than coke. This question of the competition between manufacturers and the cutting of prices makes it very important that the public should have the advice of engineers with the right experience, and who would be disinterested in the choice of a plant, to enable them to choose the one most suitable for the work required. Some which have been fixed recently will, I fear, not be of much use in a very few years' time, owing to their flimsy construction in vital parts of the apparatus.

Discussion.

The PRESIDENT said that Mr. O'Connor had very kindly thrown his lecture open to discussion; and he would be pleased to answer any questions which might be put.

Mr. P. M'DOUGALL (Helensburgh) said it would be difficult for anyone to endeavour extemporaneously to criticize the figures that Mr. O'Connor had given them. The subject of town gas in competition with suction gas, electricity, &c., had been foremost in the minds of gas managers in recent years. Of the numerous rivals on the market, he believed that suction gas was the only competitor which would prove, and was proving itself, formidable to gas managers, so far as the power business was concerned. Therefore it behoved those interested in the welfare of the gas industry to go thoroughly into the question, and satisfy themselves of the advantages, if any, that producer gas possessed over town gas as a prime mover. They sometimes heard such statements as "100 per cent. cheaper than town gas," and so on. Gas managers would require to examine the veracity of those statements, and determine if these collateral advantages were actually obtained under the ordinary working conditions, taking all things into consideration. He believed a comparison on a fair basis between town and suction gas would show that suction gas was not nearly so serious a competitor as the manufacturers of the plants advertised it. They must keep in mind that fuel was not all that was to be considered. Something must be allowed for cleaning, and for water, oil, and maintenance; and to this must be added the cost of providing duplicate plant or installing town gas. In future, he believed, the attention of engineers would be concentrated more on the efficient utilization of heat, and in devising ways and means for making it possible to have the fuel burned on the piston, which would give a higher range of power. In his opinion, the time was coming when the internal combustion engine would entirely supersede all other forms of prime mover.

Mr. J. M'GHEE (Glasgow) believed that every one of them would go away with much clearer ideas of the various methods by which those gases were manufactured. Some time ago, he saw the Dellwik process in operation in Messrs. Dempster's works at Elland; and he formed a high opinion of its capabilities. Mr. O'Connor had, he might say, confirmed this opinion. In one or two towns in Scotland the use of suction gas was a matter of serious consideration. He believed there would be startling developments in the price of coal gas in the near future.

Mr. F. L. M'LAREN (Dumbarton) thought they had all enjoyed the lecture. They had received much information about the different types of producers—not in an off-hand manner, but with facts and figures to support every point. As he was anxious to stick up for the producer-gas engine, there were one or two minor points he would refer to. One of these was the difficulty in starting. It seemed strange to him that, in spite of all the competition among makers, engines were sent out, and the purchasers were allowed to discover what was the best thing to do to make them reliable and useful. He knew of a 60-H.P. plant in which town gas could not be done without for starting, on account of moisture gathering in the plug. The works manager got a spare plug; and the man in charge of the engine had orders that this spare plug was to lie clean and polished, on the top of a warm part of the engine, ready for use every morning, and was to be put in regularly each morning, whether the old plug was likely to give trouble or not. By doing this, they had been able to dispense with the use of town gas in starting; and they had no trouble now. With the clean, dry plug, ignition difficulties were done away with; but, so far as he knew, the manufacturers of the engine did not make a point of supplying spare plugs to their customers. Reference was made to the collection of tar in coke-scrubbers. He did not know if he was right or not, but he thought that the collection of tar in the scrubbers was surely due, to a certain degree, to the scarcity of water for cleaning. But there was the point that when they supplied a liberal amount of water, there was the objection of the moistening of the gas; while the drying of the gas again was obtained by passing it through a sawdust scrubber. He would like to ask if no trouble was experienced with those sawdust scrubbers, by the sawdust being carried over by the gas into the valves, and causing them not to get down to their seats properly. The efficiencies which had been given them, he thought, were very favourable for producer-gas engines; and he believed they were very modest. He thought the efficiencies given in the comparisons between the gas-engine and the steam-engine were being superseded now. It was a feature of Mr. O'Connor's lecture that in it there was no exaggeration, but solid figures; and he was sure he expressed the views of everyone in the meeting, when he tendered his thanks to Mr. O'Connor for the information he had given them.

Mr. W. M. MASON (Glasgow) said they must look upon the gas-producer as a very serious competitor; and it would be wise on their part not to criticize it too strongly, but to endeavour to find methods of improving their own working. Of course, the principal method of improving was the reducing of the cost. If corporations and gas companies could make a special bid for gas for power, he thought they would be taking a step in the right direction. Mr. O'Connor referred to one of the troubles they had with producer plants—that of the difficulty of starting the engine. It might be interesting to know that in Glasgow there were so many stand-by meters that the Gas Committee had to make special rates for them. He supposed that all the large installations in Glasgow were supplied with a stand-by. Within the past year, at least three producer plants had been cleared away because they were not reliable, and town gas introduced.

The PRESIDENT proposed a very hearty vote of thanks to Mr. O'Connor for his most interesting lecture. He would look forward to seeing the lecture in print, because there were a great many figures given them which he would like to see again. Those who had made the subject a study knew that the number of calculations which were required to prove the facts was enormous; and he would not like to say much upon the figures that night. He might say that the one which surprised him most was the result of the Dellwik blue water gas—its comparison against carburetted water gas. He had no idea that there was such a big balance in favour of Dellwik blue water gas. There was no doubt that the question of suction gas had to be faced. Suction gas had come to stay, much as they disliked it; and anyone in the gas industry who would turn his back upon it, or sneer at it, or throw cold water on it as it were, would be no friend to the industry. The gentleman who said that night that the internal combustion engine was the thing of the future spoke a great truth. So far as efficiency was concerned, the internal combustion engine held the first place. On the question of which gas was the best, there were only, so far as they were concerned, two kinds of gas—town gas and suction gas; and for thermal efficiency—he would be very glad to be contradicted—he thought the suction producer had the best of it, for the reason that suction gas was a lean gas, and town

gas was a rich one. Suction gas, being a one constituent gas, did its work better than a gas which contained a high percentage of hydrocarbons.

Mr. O'Connor thanked the members very cordially for their vote, and also for the attention which they had given to the lecture. He knew there were a number of very hard figures in it, and very elaborate formulæ, which they could hardly follow in the course of listening to the lecture. He considered it was necessary to give them some figures which perhaps had not been usually given in discussions and in papers that were being read upon suction and other producer gases. He also thought it might be interesting to them to have a comparison between suction gas and coal gas—comparison not upon cost, but upon efficiencies. The efficiencies of any plant for the provision of power, no matter what it might be, must first be brought back to the fundamental source of power, which, in all these cases, was coal; but to speak of coal alone would not do, because they knew that every different coal, or every different colliery, varied in nature from others, and the proportions of the coal they had principally to deal with in the matter of producer plants or water-gas plants was the carbon. Consequently he made a number of calculations; and, as the President very wisely said, these calculations involved a large number of figures. As to the comparative efficiency of (say) suction gas and coal gas, he did not think it was entirely a question of lean gas and rich gas. What it really consisted of was the proportion of carbon monoxide or of hydrogen which the mixture would have when it got into the cylinder of the engine. They could compress carbon monoxide much more than they could hydrogen. Consequently they got a greater amount of explosive power, because the more they could compress gas the more they multiplied the power which they obtained from the gas-engine. About four or five times was the compression power of the pressure they obtained in the cylinder; so that if they increased it in the compression period, it would be multiplied four or five times in the explosion period. He had not given comparative costs, but comparative efficiencies; but if they had efficiency, they would have cheapness. He was sorry to say that in one of the cases he referred to the use of two plugs did not effect the required remedy. Starting had been a continuous trouble until coal gas was applied to this purpose. Tar would always be deposited on coke. The very shape of coke, and its roughness, would always cause tar to be deposited in the scrubbers, if there were tar coming forward. He thought that smooth boards might be used in the scrubbers of producer gas plants with advantage. There was not much trouble in the use of sawdust, because it did not come forward into the engine itself. He did not remember seeing a sawdust scrubber used satisfactorily with a producer plant; and possibly that was for the very reason mentioned—that dust might get forward. As to reducing the price of gas for power purposes, he heard only the previous day of an offer by an electric light company or corporation to supply motive power at 1½d. per unit if it were taken during the day or night, excepting between the hours of four and six o'clock. As regarded being forced to supply coal gas whenever it was required, he might say that in Edinburgh Mr. Herring would not do it. He required a would-be consumer to agree to his having the right to close the supply completely at any time it suited his purpose. He did not know if Mr. M'Dougall was aware of a coal-dust engine, which, curiously, was invented by a townsman of his own—an Helensburgh man—in which the coal dust was introduced into the cylinder of the engine, and was there converted into gas. Once started, the heat of the explosion made it hot enough. This engine was worked for some considerable time; and he thought that if there had been more money at the back of it, it might have done very well indeed.

The President intimated that this closed the session; and he asked the members to endeavour to make next session as successful as the past one had been.

Manchester District Institution of Gas Engineers.—We are asked by the Hon. Secretary (Mr. W. Whatmough, of Heywood) to notify that the next meeting of the Manchester District Institution will be held on Saturday, the 22nd prox., instead of the 29th. Further particulars will be forthcoming. Meanwhile, it may be mentioned that a paper has been promised by Mr. E. A Harman, of Huddersfield.

The Visit of the Cornish Gas Managers Association to Plymouth.—As mentioned in the "Journal" last week, the members of the Cornish Association of Gas Managers went to Plymouth on the 15th inst., to inspect the plant of the British Coalite Company at the works of the Plymouth and Stonehouse Gas Company. After luncheon, the party (which included several ladies) proceeded to the offices and show-rooms of the Gas Company, and examined the various appliances on view there; among them being a new inverted mantle which gives a golden yellow light instead of the white light which characterizes the ordinary incandescent mantle. This mantle attracted considerable attention. From the show-rooms the party proceeded to the gas-works, where Professor Lewes explained in detail the working of the coalite apparatus. This was fully recorded last week (p. 146). At the conclusion of the visit, a vote of thanks was passed to him for coming down from London to describe the plant, and also to Mr. P. S. Hoyte, the Engineer and Manager of the Gas Company, for allowing the members to visit the works and inspect the Company's plant and offices. The party left Plymouth by the 6.40 p.m. train, after having spent a most interesting and pleasant day.

THE INSATIABLE CAPITAL RAISERS.

We have in our possession prospectuses of the East Sussex Gas and Water Company dated Jan. 16, Feb. 1, Sept. 19, and Sept. 29 last year; but, although the Directors have been so frequently and so recently urging the public to entrust more money to those guiding the fortunes of this concern, a fresh prospectus has been issued inviting applications for 483 ordinary shares (*unrestricted as to dividend*) of £5 each. This represents the balance of the original so-called "authorized" capital of £25,000. So that, without this new issue, the Company have a heavy capital burden to bear. Generously the Directors have decided that (this is the common finesse in connection with the 99, Cannon Street promotions) the shares shall rank for dividend as from March 25 last. It is nice perhaps to "rank" for dividend; but the ultimate satisfaction depends on whether there are profits with which to pay dividend. On the accounts issued last year, there was a debit balance on the working, so that there were no profits for distribution.

In the present prospectus, it is announced, in black type, that the increase in the gas output for the December quarter of last year was nearly ½ million cubic feet over the corresponding period of 1907; and for the past quarter, 186,500 cubic feet over the first quarter of last year. The increase of water revenue in the past March quarter is said to be 30 per cent. The Directors would give a little more solid and reliable information by quoting the total figures of the sales. Considering the debit balance on the working a year ago, these increases of business will not go far towards paying dividend on the Company's heavy capital. Supposing 5s. per 1000 cubic feet is the charge for gas, an increase of ½ million cubic feet would only represent a revenue of £125, out of which all expenses of manufacture and distribution have to be paid. The "Important" "Natural Gas Development," with the report of Mr. Heims on the subject, are made use of in the same terms as in the prospectus of September last, with a little more emphasis thrown in. These matters were commented upon at the time in our columns. There seems to have been a shuffling-up of the management of the concern. There has been a good deal of change since the Company originally started. At the meeting of the shareholders in August last—in the country, and on the Saturday before Bank Holiday!—Dr. Allan Maclean presided. Mr. Edmund Eaton was the other Director present. Mr. Alfred Schofield was absent owing to ill-health. On that occasion, Mr. Grimes was put on the Board in place of Mr. Schofield. When the prospectus was issued in September last, Dr. Maclean was Chairman, Captain F. Jenkins, D.S.O., appeared as Vice-Chairman, and H. P. Davies as Secretary. In the present prospectus, Captain Jenkins, D.S.O., has been promoted to Chairman; and Mr. W. J. E. White comes on to the scene as Secretary and Director. Where, we may ask, are the others?

Memorial to the late Sir George Livesey.

Readers of the "Journal" will doubtless remember that after the great strike at the South Metropolitan Gas-Works a testimonial was presented to the late Sir George Livesey, and that the balance of the fund raised for the purpose was, in accordance with his expressed wish, expended in the provision of a recreation ground on Telegraph Hill, Hatcham. He also gave a drinking fountain, which stands in the ground, now St. Katharine Park; and shortly after his death it was suggested that this should bear some suitable inscription to associate it with its generous donor. This has recently been put upon the base of the fountain, and runs as follows: "The acquisition of this Park was largely due to Sir George Livesey (for many years Chairman of the South Metropolitan Gas Company), who, in order to secure it as an open space for the people, himself contributed £2000 to its purchase. He added to his generosity by erecting this Fountain."

"Transactions" of the Association of Water Engineers.—We have received the "Transactions" of this Association for the year 1908. The volume contains the reports of the proceedings at the thirteenth annual general meeting, held in Birmingham in June, and at the winter meeting, held in London in December, under the presidency of Mr. H. E. Stilgoe, M.Inst.C.E., the City Surveyor of Birmingham. The President's Inaugural Address and the papers, which are all of an instructive character, are accompanied by a number of folding plates, as well as by illustrations in the text. The subjects discussed at the two meetings were noticed in the "Journal" at the time. In addition to the technical matter, which includes the interesting extempore lecture on the "Measurement of Rainfall" delivered by Dr. Hugh Mill, the President of the Royal Meteorological Society and Director of the British Rainfall Organization, at the winter meeting, abstracts of legal cases bearing upon water supply, a summary of the contents of the preceding twelve volumes of "Transactions," the useful subject-matter index brought up to date, and a catalogue of the library. As usual, a portrait of the President is given as a frontispiece to the volume, which has been produced under the editorship of the Secretary of the Association, Mr. Percy Griffith, M.Inst.C.E., F.G.S.

WAVERLEY ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Edinburgh.

The Waverley Association of Gas Managers held their Ninety-Third Meeting on Friday in the rooms of Messrs. Ferguson and Forrester, in Princes Street, Edinburgh. There was a very gratifying attendance of members. The President (Mr. W. Brown, of Lasswade), on taking the chair, extended a hearty welcome to all who were present.

The Presidential Address.

The President, in his address, said: I beg to thank you for the honour you have conferred upon me by electing me your President for the past year. Following a long line of Past-Presidents, men of no mean degree, who have in the past, as well as in the present, taken a foremost place in the ranks of the profession, it is no light task that falls to my lot to-day. But it should be the aim and ambition of everyone to try worthily to follow in the steps of those who have gone before, and not be content with things as we find them, but try and improve ourselves and all with whom we come in contact. I am convinced that this can, to a certain extent, be attained by meetings such as these, when we can come together and exchange views on our daily work, and have the experience of others who, perhaps, are better able to give because of the magnitude of their works. And I am confident that such men are always willing to help their fellows. The ultimate result will be that the corporations and companies that we serve will get the benefit; and I am sure you will agree with me when I say that in many places these efforts are not so well supported as they should be by those who, in the long run, reap the benefit. For you find that very many of the managers have themselves to pay all their expenses in attending these meetings; and this cannot be very well managed out of the salaries that many corporations and companies pay. I see from the Technical Press that exception is taken to a salary offered for a certain position. But are we not ourselves to blame for this condition, by reason of the fact that for every situation advertised there is always a great demand? I have known cases, even, where certain men have offered their services for a smaller sum than was originally intended to be paid. Therefore corporations and companies are not always to blame.

We are reminded to-day that each year sees the disappearance from our midst of old and familiar faces. We have to record the retirement from ordinary membership of two of our old and valued friends—Mr. Fraser, of Gorebridge, and Mr. Bell, of Dalkeith. Mr. Fraser, though of a quiet disposition, possessed a warm heart, and always took a great interest in the welfare of the Association. It needs no word of mine to tell you of Mr. Bell's worth. Suffice it to say that he is the "Grand Old Man" of our Association. He has been always willing to help any who sought his advice, and no one was ever turned away who did so in times of difficulty. I know that he has, on several occasions, come to the help of the Association, when needed. During this day's proceedings, we will show, in a more tangible way, our appreciation of his services to us. Our best respects go with him, and may he long enjoy his well-earned rest.

Our industry continues as prosperous as ever. If one is in doubt, just look at any of the technical papers, and you will be convinced at once; and more so when we see so many attempts made to float companies in almost every part of the globe, some of which will not be anything but gas-works in name. Then there is evidently a strong desire for many to get into the ranks of the gas profession, as is evidenced by the fact that one occasionally sees that £10 will be paid to anyone getting the advertiser a situation as gas manager. It seems to me there is a feeling abroad that anyone can be a gas manager; and I think it would be well for our Association to look into the matter, for evidently men who have by their ability shown their worth are not wanted, and are being set aside for those who are technically trained. Not that I would say anything against such a training. But this is not everything. There should be alongside such a training an apprenticeship served; and the aspirant for a gas managership should learn everything from the bottom of the ladder to the top. Then, in the language of Mr. Wilson, of Glasgow, they would know when men were really doing a day's work. We have also before us the fact that many situations advertised at the present time are advertised without a salary—that is to say, that the applicant has to state his remuneration. This often leads to unduly decreasing salaries, rather than the keeping of them up. I would suggest that here our Commercial Section might help us, or representatives from all our Associations. We might have an inquiry office where, in cases of this kind, the applicant could apply for help and advice, and so prevent, to a certain extent, the cutting of salaries that goes on.

There has been quite a stir lately in the gas profession as to the best method of increasing the sales of gas. Many and varied are the means suggested—among others, a differential price. I think the better way would be that, instead of having different prices for different consumers, we should have a uniform rate for all parties; and to encourage business, liberal discounts should be given to parties who use a given quantity, as well as some rebate for quick payment. For remember that, whatever may be said to the contrary, it is to the middle and working classes that we have to look in the future, as in the past, for our best customers. I do not think it is consistent that we should give a person who uses gas for power and heat gas at (say) 1s. 6d. per 1000 cubic feet, while to another person we charge the uniform rate, simply because he uses it for light only—the one consumer using as much as the other, and sometimes more. To explain what I mean, in Lasswade we have several gas-engines working, the users getting gas at the uniform rate, less discount; their yearly bills being, on an average, about £20. We have several other consumers who actually use as much, and sometimes more; but because they use it for light alone, they are charged the uniform rate. I think it would stimulate business if we had a fixed quantity for the uniform rate, and arranged for all who used more to get a liberal discount, whether they used the gas for power or for light.

We have also a good field before us in the prepayment consumer; and I cannot understand why these poor people, who, upon the whole, are very good customers, have to pay more. I know objection will be taken to this on the grounds that the meters cost more, that it takes more time to survey them, and that their life is not so long. But this is not the people's fault. Remember, we are the merchants; and possibly a good few of these people would be quite content to jog along in their own way. But not being content with what we have done, we look around for pastures new, and we offer to put in a prepayment meter, and possibly fittings and a boiling-ring, or perhaps a gas-griller; and instead of trusting to the increased consumption, which naturally follows, to repay us, we charge them more than ordinary consumers. In some cases, the difference in price is over 1s. Why this should be, I cannot understand; for my experience has been that the people who have such meters generally burn more gas than those with ordinary meters. Then you have no trouble with bad debts. I submit these customers are a source of revenue to the company or corporation. I understand the difference in price of a two-light meter is only 13s. The time taken to survey prepayment gas-meters varies; but I should say a fair average would be about 50 per day, while for ordinary a fair average would be 150. Then I do not see that there should be much difference in the life of the meters. I remember, some time ago, Mr. Ballantyne, of Hamilton, preparing an exhaustive report on the extra charge for prepayment consumers; and among other items were the following:—

	s.	d.
Interest and sinking fund on extra cost of meter. . . .	1	0½
To survey ordinary meters, cost 0·26d. each time = 0·78d. per annum.		
To survey prepayment meters costs 1·93d. each time = 7·72d. per annum—a difference of	0	7
(Ordinary meters are surveyed three times a year and prepayment meters four times; a man being able to do fully 200 ordinary meters in a day, and less than 30 prepayment meters.)		
Attendance to meters by plumber costs for one year, for ordinary meters, ¾d. each, and prepayment meters 8¼d. —a difference of	0	7½
Damage to meters and robberies for one year	0	1½
Difference between repairing ordinary meters and prepayment meters, calculated at	1	6
Total extra	3	10½
There falls to be deducted from this the bad debts on ordinary meters, amounting to	0	6½
Net extra cost for each prepayment meter as compared with ordinary meters	3	4

Suppose the extra cost be 3s. 6d., as compared with 3s. 4d. by Mr. Ballantyne, I submit that we have (in the extra consumption, the benefit of ready money, and of the consumers that we would not otherwise have) all the extra to cover the price of meter, &c. Mr. Ballantyne finishes his report by saying that to cover the extra cost of meter would require an additional consumption of 8000 cubic feet at 5d. per 1000 extra. But I would urge, if it can be proved that a person uses (say) 1000 cubic feet extra at 3s. 6d. per 1000 feet, then you have your requirements met. And my experience has been that, instead of 1000 cubic feet extra a year, you very often get anything between 2000 and 3000 feet.

Commercial Sections have been in operation for some time in connection with the North British Association; and I am hopeful that before long we shall have one in full working order in connection with our Association. Personally, I am convinced that the benefits to be derived from such sections are of immense importance—more particularly to those of us who are in charge of small works.

I expect that our companies and corporations will be able to get their coal on more favourable terms this year than last; and I may here say, in passing, that I do not think we have much to fear from the operation of the Miners' Eight-Hours Act. Certainly, there may be a little trouble at the start; but once it is in actual operation, I think it will ultimately come that coal will not be any dearer than at the present time.

I do not think I can tell you much about Lasswade to interest you. Some two years ago we put up a new set of condensers, which I will briefly describe. Being very much hampered for want of room, we had to place our condensers and scrubber in the garden on the opposite side of the road from the works; and some objection was raised to them standing very high. So, after making some inquiries, it was decided to put up a set of inclined condensers; and the following is the specification: Cast-iron chest 12 ft. by 2 ft. broad by 3 ft. 6 in. high, 14 flange and faucet saddles to suit the slope of the ground, 14 Mannesmann 9-inch steel spigot and faucet tubes, seven of them about 20 feet long and the other seven of a length to suit the slope, with cleaning bonnets, &c. My reason for adopting these was that, in the event of any enlargement, we can take off the bridge-pipes, put in another length, and increase our condensing power at a trifling cost. We have also put up a new holder; and during the summer there was laid about a mile of Mannesmann tubes, 4 inches in diameter, with lead-wool joints. As there was no connection to come off this, I can tell you it was a great advantage. Certainly, there was a little more elbow grease required in making the joints, but the benefits otherwise more than repaid the extra labour; and the ease with which one could get round a corner was a source of wonder to many who had not seen the like before.

Discussion.

Mr. W. Blair (Helensburgh) thanked the President for his address. The subjects he had dealt with were of interest to all who were connected with the management of gas-works. The question of the filling of vacant situations in connection with the management of gas-works was a pretty old bogey, and had been before them for a good many years. It changed from time to time. Sometimes it seemed to be that almost boys from the fourth standard were selected to fill important situations. At other times old men, getting on to the sere and yellow leaf, were selected to fill situations—such as he had himself. But it was a pity that Associations such as theirs should not form themselves into a sort of Trade Union, and endeavour to see that situations were filled up by men of ability. He did not discredit technical education in the least. Still, after all technical education, it was practice which paid—it was practice which was the mother of technical education. It was in practical experience that all technicalities were produced. They had seen situations filled in which, if a committee of gas managers had been consulted, the appointment would have been different. It was a thing he would like very well to see taken up by the Institution of Gas Engineers, and other bodies, if at all possible, because corporations and companies were trying to get officials at the cheapest possible rate. He knew that technical education might give a groundwork; but with all the technicalities possible, a manager, on going into a gas-works, was simply entering upon the beginning of his education. He did not think there was much to be gained by differential charges for gas, particularly in residential localities, such as Helensburgh was. They had differential charges; but he induced his Council to reduce the price of gas to the lowest possible, with one figure for all. This seemed to suit the community very well. They should not forget that it was the lighting customer who had brought them to their present state, and who had been their supporter all along. He thought that many were making too much of a reduction to those other people, who might throw off their supply at any time. However, the question was one for everyone to deal with for himself. He did not know that it would not be better if, as the President stated, discount were given to all consuming over a certain quantity of gas. The President referred to the prepayment consumer. If it had not been for the prepayment consumer, he (Mr. Blair) was afraid some of them would have been at a standstill. In the majority of cases, he was persuaded, nearly 50 per cent. of the increase in gas-works output, during the last fifteen or twenty years, was due solely to the development of the sale of gas by prepayment meters. In many cases the prepayment consumer was being overcharged. They were taxing him really for becoming a customer, when they charged him more than 5d. per 1000 cubic feet extra. He thought the prepayment consumer should be encouraged. There was only an extra 13s. expended upon the meter; and in some cases the additional consumption would run up to even 10,000 cubic feet. In large cities it might cost something to survey the meters and collect the coin; but in a district like the Waverley, there was sufficient time for the manager to do the work without any extra expense. They had about 350 prepayment meter consumers in Helensburgh. The extra charge was 10d. per 1000 cubic feet; but he was quite prepared to advise that it be reduced to 5d. He was convinced that this would meet all their extra cost. Seeing that they were giving meters free to other customers, he did not think they should charge prepayment consumers all the cost of supplying their meters. In the majority of cases, he found they got more from a prepayment consumer than from an ordinary one. He did not think that the Miners' Eight Hours Act was going to affect them very much. A great many miners had been voluntarily working no more than eight hours a day. He must compliment the President on adopting inclined condensers. This was a form of condenser that he had a special love for. They could be easily extended; they were easy of access; and condensers of this sort would assist their scrubbing arrangements to a great extent. He had no doubt the President would find that his liquor would be 2° or 3° Twaddel greater in strength than with an ordinary condenser.

Mr. H. O'Connor, F.R.S.E. (Edinburgh), said he supposed they would expect him to make some remarks on the question of the training of the gas manager. He had had a good many of the younger gas managers through his hands, in attending his lectures; and he quite agreed that mere technical knowledge was not in any way sufficient to enable a man to take up the work of a gas manager. He must at the same time have his own practical experience. But he considered that gas managers should have technical knowledge as well; and it was only by attending the classes which were now being held all over the country that a man could make himself really efficient on the technical side, so as to be able to carry on the work satisfactorily, both for himself and for the people he served. He thought the suggestion Mr. Blair had made—that a committee of gas managers might be called in by corporations and companies when they were appointing a new manager—was really a most excellent one, and one which would be of great assistance and benefit to the companies and corporations. At least a committee might go so far as recommending (say) two or three of the candidates as being the most suitable to choose from, and allow the company or corporation to select finally for themselves. As regarded the question of differential prices for motive power and for lighting, the Commercial Gas Company (London) gave a discount, for the first £100 worth of gas used for power, of 10 per cent.; for £150, of 12½ per cent.; for £175, of 15 per cent.; for £200, of 17½ per cent.; and for £250, of 20 per cent.—if the gas were used for power only. If power were required principally during the day, the mains through which the gas was supplied—more especially in the case of smaller companies—were practically lying idle, except for the few hours when gas for cooking would be required. Consequently, the cost to them would not be so great as it was in the case of the ordinary consumer, who took gas at the peak of the load. Gas supplied during the day practically did not require a holder at all. The gas as it was made simply passed through the holder to the mains, and direct to the gas-engine; and then, again, they could supply a much increased quantity of gas during the day without extending their retort power. They would be merely keeping their retorts going at full stretch during the day instead of having them lying off waiting for the night. So that, he thought, a reduced price for power was well worth consideration, especially when they looked into the question of suction and producer gas. When they did this, they found that, unless they could reduce the price of coal gas, it would pay the consumer to put down plant for himself, and manufacture producer or suction gas, and provide power which otherwise he might be able to do with coal gas. They had thus several reasons for reducing the price of gas for power, especially when this was required during the day. As to the charge for gas used through prepayment meters, the President mentioned that 3s. 4d. per 1000 cubic feet extra would be required. If they had 4000 cubic feet of gas consumed per annum through a prepayment meter, and they distributed the 40d. over this quantity, it came to 10d. per 1000 feet as the amount of the extra cost for wear and tear, collection, and so on. That was to say, with a consumption of 2000 cubic feet they should put on about 20d. to make it equal to the charge to an ordinary consumer. In small towns, therefore, where the consumption would be about 2000 cubic feet per annum, an extra charge of 10d., which was a usual one, did not seem to him to be too high to bring a prepayment meter consumer into line with one using an ordinary meter. He had not had the opportunity of seeing the sloping condensers since they were put up; but he saw the drawings, and he must say that the plan was a most admirable one for obtaining the necessary area without raising the condensers up into the air, and making them an eyesore in the place.

Mr. D. Macfie (Edinburgh) thought the President made a very sensible protest against the ridiculously small salaries that were being paid to gas managers in Scotland. He had recently to do with the appointment of a manager for a Continental gas-works, and he was surprised at the number of applications, and at the experience which many of the applicants had had—being men who had spent a good deal of time in connection with gas-works, and who were willing to give their services for a very small sum. With regard to the point raised about a committee of gas managers assisting in the selection of officers, he was afraid it would not work very well. It would open the door to a good deal of back-stairs influence; and he thought there were few who would care to act upon such a committee. He considered that the proper plan would be for corporations and directors to make a point of visiting the works of those who were put upon the short leet. He was sure they all heartily endorsed the President's remarks about Mr. Bell, who had been so long connected with the Association, and who had also done such excellent work in connection with the North British Association. He was a man of unique and large experience, and in connection with his friend the late Mr. Young, of Peebles, was kept in touch at all times with the latest results in the manufacture of gas. The question of the supply of gas was very different now from what it was fifty years ago. Then they were all gas lighting companies; but now they were not simply makers of gas for lighting, but for cooking, heating, and power as well. The change was such that he thought differential prices were fully justified; but all companies and corporations must decide this question for themselves. He had a case in point which might illustrate what he meant. He knew of a corporation who were supplying gas through a 3-inch main to a manufacturing works. They had no power to make differential rates, and were charging about 3s. per 1000

cubic feet to all consumers. The manufacturer consequently set about seeing what he could do with a suction-gas plant. He had seen a large consumer lost to a corporation because they had not the power to charge differential rates. They were aware that the prepayment meter was introduced largely to tap a new source of supply—the supply of gas to those whose credit was not good, or who had not the thrift to save 10s. for the quarterly bill. The prepayment meter was so successful that he believed, in many towns, a larger number of these meters was being used than was really justified, because, so long as a customer paid his account regularly, and his credit was good, it did not appear to him that he should get a prepayment meter. When they came to the question of how much extra they should charge, they must remember that in some towns meter-rents were still charged; and if this were so, a larger charge must be made for prepayment meters. In towns where meter-rents were abolished, one felt it was time that all meters should be on the same footing.

Mr. W. Carmichael Peebles (Edinburgh) joined with the other speakers in congratulating the President upon his address. He did not think that because gas was to be used during the night, consumers should be charged more for it. Suppose they were to put it the other way, the charge would not be agreed to at all. He thought the better plan was as had been introduced by Mr. M'Lusky at Perth, to make a certain charge for gas to all, and then reduce it according to the quantity consumed. The conditions were such that they should not only give a reduction to the consumer who used gas for power, but also to the one who used it for lighting. The President's arrangement of the condensers was one which would suit very well in small works. They could not do too much in the way of looking after the appearance of their works.

Mr. J. Tulloch (Loanhead) considered that prepayment meter consumers should be charged about 10d. per 1000 cubic feet extra. Those who took 5000 cubic feet in a year would only pay 4s. 2d., which would pay for the meter. Meters were only guaranteed for five years, though they knew them to last longer.

Mr. D. Vass (Airdrie) said his experience was that the quantity of gas consumed by automatic lighting was very much below the average of that consumed in ordinary lighting—in fact, it was nearly half. If the automatic consumer used the same quantity as the ordinary consumer, the difference, in his case, to meet renewal charges and extra cost would be 3¼d. or 3½d. The slot consumer, in his case, using only about half the average quantity taken by the ordinary consumer, the extra cost worked out at about 6½d. They charged 5d. extra. A fair way to look at the matter was to consider what were the extra charges, and the repairing charges, on the respective consumers, and thus arrive at a figure to justify them making a difference in the rate.

Mr. J. M'Laren (Duns) referred to the remark by Mr. Blair about the formation of a union. This was a thing they ought to have. Corporations and companies did not always know the value of their gas managers; and he thought it would be a very good thing for them to form themselves into a union, so that they could go together and assist anyone who might be in difficulties. When he went to Duns, ten or eleven years ago, there were no prepayment meters in use. He introduced them—he was sorry to say not many, about thirty; and he had had little trouble with them. They charged 2s. 6d. a year meter-rent, the same as for ordinary meters. He had never altered these meters. When he changed the price, he gave the consumer the extra cash back, after taking what the meter registered. The price of gas was the same for both classes of consumers—5s. 5d. per 1000 cubic feet.

Mr. Vass remarked that if anyone came after a certain hour at night, he had to pay the charge for a man going to attend to a prepayment meter. During the week, and on Saturday afternoon, the charge was 6d.; on Sunday, it was 1s. They had sometimes had trouble with ice-cream shopkeepers hunting up their men on Sundays, on account of their meter having stuck on the Saturday night. By making the charge, they had stopped a great many of the crooked pennies. The people were now more careful and did not seek to put in twisted coins.

Mr. A. Mackenzie (Edinburgh) had no hesitation in saying, from information he had received from all over the country, that an excess charge of 3d. or 3½d. was quite sufficient, beyond the ordinary price of gas, for a prepayment meter.

Mr. W. Young (Penicuik) stated that when he went to Penicuik, about eleven years ago, there were some 130 prepayment meters in use; while now he had 320. They charged 5d. per 1000 cubic feet more per meter. He had little trouble with them; and he was only sorry he could not see his way to put in another 320 of the meters. They had resulted in an addition to the sale of gas. In some cases he got from a consumer double what he did when an ordinary meter was being used.

Mr. Carmichael Peebles was afraid that gas managers did not often appreciate what the value of a five years' guarantee of a meter was to them. A five years' guarantee for an instrument made up of leather, wires, small brass pieces, and so on, was a very good one. The meter was not in the hands of the maker. He did not control the quality of the gas supplied. He did not know whether it was to be water gas, ordinary coal gas, or gas from cannel; and the constituents of the gas which would affect the diaphragms, and would carry away the oils and preserving materials they put into them, would affect very materially the life of a meter. Under the guarantee, a meter might be sent back on account of all sorts of things—being fast or slow, or not registering—and the maker had to pay the carriage going and returning, and to bear the cost of repairing and painting. This made a great hole in the profit to be derived from the meter. The condensation and other dirt they found in meters was sometimes so great that the men would not handle them. Yet the meter maker was responsible, during the five years, for all these things. He would give a longer guarantee with pleasure, if they allowed him to control the gas to be supplied, and the place where the meter was to be fixed.

The President thanked the meeting for the way in which they had received his address. In connection with automatic meters, his position was this: He had before him a list of three consumers who burnt about 10,000 cubic feet of gas a year. He sometimes had a tremendously long time to wait for his money; and he asked his Directors to be allowed to put in a few slot meters on trial. The result was that in all of those cases there was an increase of about 4000 cubic feet in a year. His argument was that if a consumer were burning 1000 feet with an ordinary meter, and he burnt 2000 cubic feet with a slot meter, the extra 1000 feet would earn for them what would repay the extra cost of the slot business. His point as to differential prices was that there should be a uniform rate for lighting and power, and that when a certain quantity of gas had been used, a liberal discount should be allowed, to encourage the consumption of gas. In Lasswade, there were two large factories in which gas was used for lighting only. They burnt, between them, about £200 worth a year. Alongside of them was a joiner, who had a gas-engine, and who consumed only £20 or £30 worth of gas per annum; and he said it was not fair that the joiner should get his gas cheaper simply because he used it in an engine.

Election of Office-Bearers, Etc.

The election of office-bearers resulted as follows:—

President.—Mr. H. Rutherford, of Aberlady.
Honorary Secretary.—Mr. W. Brown, of Lasswade.
Members of Committee.—Re-elected.
Auditor.—Mr. J. O'Halloran, of Edinburgh.

Mr. T. O'Neil (Dunbar), the Past-President, presented Mr. Brown with the President's Medal; and Mr. Brown returned thanks.

The members and friends, to the number of over 70, afterwards dined together—Mr. Rutherford in the chair. The toast of "The Waverley Association" was proposed by Provost Smith, of Dunbar, who has been for many years Convener of the Corporation Gas Committee, and who said that if there was anything he took an interest in outside of his own business it was gas. He had a warm side for gas managers, and considered that corporations did not pay them as they ought to be paid. Mr. W. Brown responded. Mr. W. Young proposed "Kindred Associations," and Mr. W. Blair acknowledged. "The Traders" was proposed by Mr. D. Vass; and Mr. A. Mackenzie acknowledged it.

Presentation to Mr. A. Bell, Sen.

Mr. W. Brown said that, unfortunately, Mr. A. Bell, sen., of Dalkeith, who was to have been the recipient of the gifts which had been subscribed for, was so unwell that he was unable to be with them. Mr. Bell felt very much his position in not being able to be with them; but, acting on his doctor's instructions, he was obliged to remain at home. In Mr. A. Bell, jun., of Peebles, however, they had a worthy son, who would accept the gifts on behalf of his father and mother. Before the presentation was made, an opportunity would be given to anyone who might wish to pay a tribute to Mr. Bell.

Mr. J. Dennis, of Dalkeith, said he could say nothing approaching even bare justice to Mr. Bell, who had so efficiently and for so long performed such useful work for them. He had had the good fortune to be a member of the Dalkeith Gaslight Company for most of the nineteen years their friend had been Manager; and he knew him for several years before he took over the duties there. It was with the greatest pleasure that he testified to his rare gifts and his faithful and efficient management. As their honoured representative, he had "spread the light" in a thousand different ways, both by night and by day, during all those years. He had a thorough grasp of his profession; and he believed he was in public favour and esteem with those among whom his lot had been cast by a kind providence for so many years. His decisions usually carried considerable weight among the consumers as well as with the Directors; and he merited their appreciation and gratitude, having had all along a high sense of his responsibility to the Company and to the consumers. In a word, he might say they were proud of Mr. Bell as their Manager; and they cherished the hope that he might have renewed health, might live long, have much happiness, and thoroughly enjoy his well-earned rest. He might mention that the Directors were anxious to retain Mr. Bell's valuable services longer; and in order to secure this, they officially offered to get him an assistant who would have very much relieved him of at least many of the duties he had hitherto performed. After due consideration and further professional advice, he decided to retire, hence their taking advantage of this opportunity to pay tribute to his long and faithful services.

Mr. D. Vass, as a very old member of the Waverley Association, and, he thought, the oldest Past-President there, would like to pay a word of tribute to Mr. Bell. He could remember how kindly was his action when he came, quite a stripling, to the Waverley

district, twenty-two years ago; and he appreciated the fatherly feeling Mr. Bell showed towards him at that time. From that day to this he had cherished his friendship with Mr. Bell.

Mr. D. Macfie wished to add his testimony to the worth of Mr. Bell. They all knew how earnest he had been in his work as a Manager, and how thoroughly intimate he had been with all that had been done in connection with the gas industry. They were perhaps apt to forget his earlier career, which was very creditable to him. Some weeks ago, when he saw him, he was full of reminiscences. He told him the story of his going to Gibraltar. They knew that Mr. Bell, when he returned to this country, found employment in connection with the Edinburgh Gas Company, and how he distinguished himself there; and it was a great gratification to his friends that he took up the position of Manager at Dalkeith. In this position he had fulfilled his duties with very great credit to himself. They rejoiced to see his son taking a worthy place in connection with the gas industry, and likely to take a higher place—if his modesty did not prevent him. They thought of Mr. Bell as one, not of the first generation of gas managers, but certainly of the second generation. He continued his work into the third generation; and they did themselves honour in honouring him. They regretted exceedingly that he was not with them that day. He was, however, worthily represented by his son; and they asked him to convey to his father their good wishes.

Mr. A. Mackenzie recalled that the late Mr. William Young, of Peebles, was a pupil of Mr. Bell's. Later, on his return from Gibraltar, Mr. Bell was offered the position of Gas Manager at Kelso. He was under obligation to go to the oil-works at Clippens, which Mr. Young was then in charge of. He went to Mr. Young and asked to be relieved of his promise to go there. He said his heart had always been in gas-works, and he would like to take the post at Kelso. Mr. Young said, with the kindliest feeling possible: "You blackguard, when I was a laddie with you, you kept me on the grindstone, and now that it's my turn to be top dog, I will keep you on the grindstone."

Mr. A. H. Hamilton, of Glasgow, as one of the youngest men who had come into contact with the gas industry, would like to add his view of the esteem they all held Mr. Bell in. He looked back with the greatest pleasure to the visits he had paid to Mr. Bell. He spoke, not as one who had received great benefit from him in business, therefore he spoke with deeper feeling, and more as a friend. He never went into his place without feeling that he was going in to a father who could, and who did, give him good and sound advice, who was ready to inspire younger men like himself upon any subject in or of the gas trade. He had pleasure in being there to bear testimony to the worth of Mr. Bell, and his high appreciation of his work.

Mr. W. Brown, having been closely associated with Mr. Bell and his son in the gas profession, said he had come to look upon Mr. Bell as a father. He took a kindly interest in any young man who was willing to learn; but if he told any such to do a thing, and he did not do it, woe betide him. He would never help that young man again.

The President said that, as had been remarked, they felt very sorry indeed that Mr. Bell was unable to be present. He was acquainted with Mr. Bell before he went to Gibraltar. During his membership of the Association, they had been greatly indebted to Mr. Bell for many kindnesses. Sometimes one who was to take part in their proceedings was prevented from attending; but with Mr. Bell present they were never afraid to go forward, and were always certain of having a good meeting. He had great pleasure in asking Mr. Bell, of Peebles, to accept of the small presents they offered as a token of respect from the members and friends of the Association. They hoped he would convey to his father and mother the kind and affectionate feelings of every member of the Waverley Association towards them.

[The gifts consisted of a purse of sovereigns, a blackthorn walking stick with silver mount bearing an inscription, for Mr. Bell, and a Shetland shawl and diamond mounted gold brooch with an inscription, for Mrs. Bell.]

Mr. A. Bell, jun., said, on behalf of his father, he had to express his very deep regret and disappointment at not being present; but he felt that the state of his health must be his excuse for being absent on this most interesting occasion. For himself and the other members of the family, he had also to express how sorry they were, seeing the Association had been so kind as to honour him in this way. He must thank the Association and other kind friends most cordially for the handsome gifts; and yet, handsome as they were, he was sure his father would value them still more highly on account of the hearty feelings of the members towards him, of which feelings the gifts were the outward tokens. There was no doubt a feeling of sadness in connection with the presentation, for it marked the end of the long and pleasant intercourse his father had had with the Association. At the same time, the gifts would in days to come be a pleasant reminder of the many happy days he spent in their company. He had also to thank them for so kindly and thoughtfully remembering his mother, who, he could assure them, had been a true helpmeet to his father. If anything could enhance the value of the presentation, it would be the kindly tributes which had accompanied it.

The proceedings were shortly afterwards brought to a close.

The late Lady Aird, the wife of Sir John Aird, Bart., whose death was recorded in the "Journal" for the 6th inst., left £13,218.

EFFICIENCY OF VARIOUS GAS-LAMPS.

A few months ago, a paper on "The Comparative Practical Efficiency of Various Types of Gas-Lamps" was read by Mr. R. C. Ware before the New England Section of the Illuminating Engineering Society. It has since then been re-arranged, and published in the Society's "Transactions," from which it is here reproduced practically in its entirety.

Although there have been numerous and exhaustive researches regarding the practical efficiency of electric lamps in common use, there has not, to the author's knowledge, been similar work to determine the actual rating of the different types of gas-lamps, and of the same lamp with different glassware. That is, distribution curves have been worked out, and tables have been compiled for showing the comparative consumption and maximum candle power per cubic foot per hour, or mean spherical candle power per cubic foot per hour, &c. But regarding the practical application of the lamps there are few data. The author has accordingly worked out some rough calculations along this line which may be of interest. It should be explained that the results described are at best very rough, and, since they were reached purely by calculation and not by actual test, there is likely to be some variation from conditions obtained in actual practice.

There has been chosen for the problem a rectangular room 50 ft. by 30 ft. and 12 feet high. The area is sufficiently large to allow the lamps to be so placed, if desired, that where reflectors are used the main flux of light shall be directed entirely at the floor, and shall not reach the walls. The plane of illumination is 3 feet above the floor, and the average illumination to be secured is 3 foot-candles for the whole area. This intensity has been pretty generally agreed upon as being a mean which suits most ordinary purposes. There is, therefore, an area of 1500 square feet requiring a supply of 3 "lumens" per square foot, or 4500 lumens in all—a lumen being the amount of light required to give an intensity of one foot-candle over a surface of one square foot.

Applying the flux-of-light method of Messrs. Cravath and Lansingh to determine the number of effective lumens given off by the various burners under consideration, the results shown in the accompanying table are obtained. The effective angle of illumination for general lighting purposes has been taken as 60° above the vertical. At the usual height of a chandelier—about 7 feet above the floor, or 4 feet above the plane of illumination—light given off at this angle will strike the plane at a distance of about 7 feet. This angle is possibly somewhat low for light sources of high candle power; but for the consideration of the lower power lamps, the light given off above 60° would not play a very important part in direct illumination.

It should be noted, however, that in the case of a large room it is not safe to disregard entirely the direct light given off above this angle, because the total amount of such light coming from many lamps at a distance adds materially to the illumination at any given spot. However, for the more common problem, of a room of only moderate proportions, the angle stated is probably sufficiently correct. It should be further noted that in all unshaded lamps, except the inverted mantle burner, the maximum intensity of light is given off at about the horizontal. Where the walls of a room are dark, so that reflection from them is missing, it is, of course, desirable to utilize the horizontal rays to as great an extent as may be possible.

In the table two cases are given. One shows the number of lamps required for the chosen room, where both the ceiling and the walls are dark, so that only the direct illumination is utilized. This condition, with absolutely no reflection, is, of course, almost purely theoretical, and is seldom met in actual practice. Under the second case are shown the number of lamps, &c., required for the same illumination in a room with light ceiling and walls.

As regards the various lamps studied, the open-flame burner gives an illumination singularly uniform in every direction; the only point where the intensity falls off materially being in the zone of 5° or 10° directly under the burner. In all other directions the light given off is almost uniform. The adoption of this burner for the dark room in the first case would ensure a moderately even illumination, provided outlets were arranged in sufficient number—preferably not more than five lamps to a fixture. It will be seen that the cost of installation will be high in this case, and the operating cost very high—69 burners being required.

The bare mantle has a well-defined shadow beneath it, and is objectionable on this account, but is more particularly so by reason of its great brilliancy; and it should, of course, never be employed unshaded. The number of burners in the chosen problem is only about one-half that of open-flame burners required; this somewhat unfavourable showing being due to the small proportion of light given off below 60°.

An installation of mantle burners equipped with a proper globe requires 33 lamps, the total light given off below 60° being somewhat more than that afforded by the bare mantle; while the distribution is better, there being no dense shadow beneath the lamp. It is interesting to note that the total absorption by this form of shade is about 47 per cent. for equal gas consumption. In spite, however, of the loss in efficiency, a burner equipped with this shade is in general far preferable to the open-mantle burner, owing to the great decrease experienced in the intrinsic brilliancy of the lamp.

TABLE *showing Results of Tests of Various Types of Gas-Lamp.*

[Room, 50 ft. by 30 ft., 12 ft. high; 1500 sq. ft.; plane of illumination, 3 feet above floor; intensity, 3 foot-candles; effective angle, 60°.]

Type of Burner.	Effective Light below 60° in Lumens.	Light above 60° in Lumens.	Mean Spherical Candle Power.	Consumption. Cubic Feet per Hour.	Case 1.—Dark Room.				Case 2.—Light Room.			
					Number of Lamps.	Total Cubic Feet per Hour.	Total Effective Lumens per Cubic Foot per Hour.	Consumption. Cubic Foot per Hour per Foot-Candle per Sq. Ft.	Number of Lamps.	Total Cubic Feet per Hour.	Total Effective Lumens per Cubic Foot per Hour.	Consumption. Cubic Foot per Hour per Foot-Candle per Sq. Ft.
Open burner	65	186	20·0	5·00	69	345	13·0	0·0767	40	200	22·2	0·0444
Upright Lamp.												
Bare mantle	119	672	63·0	3·70	38	140	32·2	0·0311	16	59	77·5	0·0131
Globe	137	430	45·0	5·00	33	165	27·4	0·0367	18	90	49·0	0·0200
Opal dome and bobesche	212	283	39·4	3·60	21	76	58·9	0·0169	16	57	78·6	0·0127
Fluted flat reflector	183	528	56·0	3·70	25	92	49·5	0·0204	14	52	85·1	0·0116
Inverted Lamp.												
Bare lamp	272	507	62·0	3·22	17	55	84·5	0·0122	11	35	123·9	0·0078
Ground glass	226	420	51·5	3·00	20	60	75·3	0·0133	13	39	110·3	0·0087
Prismatic distributor	446	200	51·5	3·22	10	32	138·5	0·0071	9	29	154·0	0·0064
Clusters.												
Four-burner upright	1090	1910	239·0	19·00	4	76	57·0	0·0169	3	57	82·5	0·0127
Three-burner inverted	890	1838	217·0	11·00	5	55	81·0	0·0122	3·3	36	123·0	0·0080

The prismatic shade for the upright mantle burner gives much the same distribution and candle power below the horizontal as the above-mentioned globe; but the absorption is considerably less. Moreover, the shade is more artistic, and is for this reason preferable. For general illuminating work, this is probably the most satisfactory of the upright mantle globes, and is worthy of more extended adoption.

The next lamp listed is the upright mantle, equipped with an opal dome and "bobesche." This lamp gives a powerful light throughout an angle of about 30° from the vertical, and even if hung high is sure to give a spotty illumination. It has been included in the list, however, as it is a very common type, and is still widely used for general illumination where some other form of shade might better be employed. For general purposes, the distribution would be aided by the omission of the bobesche. Unfortunately, however, the author has been unable to secure curves showing the distribution without the bobesche. Twenty-one lamps with this equipment will be needed to give the total of 4500 lumens required; but to secure an illumination reasonably even, more lamps would be necessary. It is noteworthy that the absorption of light by this equipment is about 36 per cent.

The last lamp of the upright mantle pattern to be considered is that equipped with the common flat fluted opal glass reflector. This equipment gives a fairly good distribution; the chief objection being that the mantle is left exposed to view. The number of lamps of this pattern required to secure fairly even illumination is 25.

It is unfortunate that no effective study of prismatic glassware has been made with a view to provide prismatic reflectors of the pagoda or inverted-bowl type, very similar, in general, to the bowl reflectors for electric lamps. A reflector of this type could be made to give a very satisfactory distribution curve for upright mantle burners at very much greater efficiency than is done by any of the reflectors for this type of burner now in use. Inasmuch as the upright burner will for many years have a very distinct field, it would seem that some investigations along this line might profitably be made by the manufacturers.

Turning to the inverted gas-burner, which during the past year has been proved thoroughly reliable and efficient, it is found that only 17 of the unshaded lamps are required to give the 4500 lumens specified. It should be noted here, however, that the inverted lamp ought, in general, to be hung somewhat higher than has been the custom with the ordinary burners previously in use. The height of about 8 feet will give very satisfactory and uniform results. The bare mantle, even if hung high, is open to the objection common to all incandescent lamps, that the high intrinsic brillancy is distinctly uncomfortable, though, owing to the larger surface involved, this objection is not so strong as in the case of the electric incandescent lamp.

The inverted gas-burner equipped with a ground-glass globe shows an absorption of about 17 per cent. The distribution is not quite so good as in the case of the bare lamp; there being a small zone of high candle power at the nadir. Twenty of these lamps would be required; and though the illumination produced would be somewhat more spotty than in the case of the bare mantle, the general effect in the room would be preferable, owing to the diffusion of light at the lamp.

Beyond any question, however, the most satisfactory lamp of those in the table is the inverted mantle equipped with prismatic distributing reflector. The amount of absorption here is about the same as that of the ground-glass globe. The distribution, however, is vastly superior, and only 10 lamps are required for producing the specified 4500 lumens. It would, however, be inadvisable to hang these lamps at the usual height of 7 feet; better results being obtained at the height of 8 ft. 6 in.

The figures referred to thus far were calculated for a room with dark walls and ceiling. Such conditions are, however, extremely rare, and account should be taken of the reflection from ceiling and walls. If the amount of light given off above the chosen angle of 60° were the same in all cases, the figures already given would be sufficient to indicate the relative value of the lamps. Inasmuch, however, as the light actually given off above 60° varies greatly, as shown in the table, the second case, where light walls and ceiling are specified, must be considered.

Messrs. Lansingh and Rolph presented a paper at the convention of the Illuminating Engineering Society last October, showing the increased horizontal illumination due to light ceiling, light walls, light floor, and the interaction of these different surfaces with one another.* The results were noteworthy. The effective angle in this case was about 50°; and an analysis of the light given off above this angle shows that the lumens reflected were between 40 and 50 per cent. of the total amount thrown against the walls and ceiling. Their paper, however, was based on purely laboratory conditions.

It may safely be assumed that, in ordinary practice, the reflection would not be so high as this. The reflection of ordinary foolscap paper is 70 per cent., and of chrome yellow paper about 62 per cent. In ordinary conditions, one would probably get a figure lower than this; the ordinary light buff walls and finish and the tinted ceilings which are commonly met with, probably giving a diffuse reflection of less than 60 per cent. This figure, of course, would apply for the first direct reflection, which would account for only a portion of the total light under consideration. The rest would have to be two, three, four, and more times reflected before it reached the plane of illumination, losing each time in amount. There would also be a loss in reflective efficiency due to the presence of goods, show-cases, doors, windows, &c., which would vary greatly with the different cases.

Assuming, therefore, 25 per cent. as a basis—probably high for the rough calculations in view—it is found that by adding 25 per cent. of the lumens given off above 60° to the effective lumens below this, the number of lamps required for the specified illumination of 3 foot-candles on the plane is reduced in the case of the open-flame burner from 69 to 40, and in the case of the bare mantle from 38 to 16. In this case most of the light is given off above 60°. In the case of the globe, where there is less proportional light given off above 60°, the number is reduced from 33 to 18. The same holds true in the case of the fluted opal reflector, where most of the light is given off below the horizontal. Here the reduction is from 25 to 14. With the opal dome and bobesche, the number is reduced from 21 to 16. It should be stated here that with this equipment the lamps should be hung high, as, owing to the powerful light immediately below the lamp, the distribution is greatly improved by the added height.

The figures bring out another important consideration—viz., that with light walls and ceiling a lamp may be hung higher than would be possible with dark walls and ceiling, for giving the same average illumination on the chosen plane; moreover, greater uniformity is obtained. With the inverted gas-burner unshaded, the number is reduced from 17 in the first case to 11 in the second. When the ground-glass shade is used, the number is reduced from 20 to 13. With the prismatic distributing reflector the reduction is from 10 in the case of a dark-walled room to 9 in a room with light walls and ceiling.

Referring to the paper of Messrs. Lansingh and Rolph, it is to be noted that the reflected light from the ceiling which represents the greater proportion of the increase due to the light colour mentioned has a marked effect on the uniformity of the illumination throughout the room; the strongest reflection being directed towards the centre of the room. This fact is worth noting in laying out installations; for lamps may be placed closer to the walls, and with more free space in the centre, than would theoretically be possible unless this fact were taken into consideration. This result will permit of higher illumination values being given to counters, shelves, desks, &c., than has perhaps been generally the case, at no appreciable loss to the lighting of the centre of the room. This condition still further accentuates the necessity of co-operation between architects, builders, and illuminating engineers to prevent waste of light by the use of colour schemes of low reflecting value.

* See "JOURNAL" for March 2 (p. 621).

It is likely that in practice the total amount of reflection from ceiling and walls may be reduced below the figure assumed; and for this reason the lamp giving the best downward distribution of light will prove more efficient. There is, further, the advantage of the major part of the light being direct in the case where the prismatic reflector is used; whereas in the case of the open lamp a very large part of the light falling upon the plane of illumination is complexly diffused. For purely general illumination, the latter case may be desirable; but for any definite work there should be a definite direction to the light, so that fairly distinct shadows may be utilized. It is found also that the purely diffused lighting system entails a serious strain upon the eye; there being practically no shadows on which the retina may be directed when fatigued. The light enters the eye from all directions—below as well as above. This is true to a less extent where the illumination is general and largely reflected from the walls and ceiling of the apartment lighted, as in the case of the bare lamp; but is greatly reduced by the use of the reflectors for directing the light downwards. The character of the surfaces constituting the plane of illumination, of course, has a very marked effect in this regard; a surface largely light-coloured reflecting a great deal of light directly into the eye.

In each case taken, there is given a column showing the consumption of gas per hour per square foot of the plane in question required to give an illumination of one foot-candle. These data may be found useful for rough determinations of the total amount of gas per hour required for lighting any specified area with a chosen type of burner. The results obtained in this way will not in all cases allow uniform illumination. In order to obtain this result, some variations from the number of lamps determined above would certainly be necessary in cases where a very strong light is concentrated immediately beneath the lamp. In general, however, by a suitable arrangement of the fittings employed, fairly uniform results can be obtained with a specified number of burners.

SULPHUR AS A CAUSE OF CORROSION IN STEEL.

At a recent Meeting of the London Section of the Society of Chemical Industry, a paper on the above subject was read by Mr. G. Nevill Huntly. We reproduce it from the current number of the Society's "Journal."

A considerable amount of work has been published during the last few years dealing with the corrosion of iron and steel; attention having been chiefly concentrated on the effect of the presence or absence of carbon dioxide. An investigation into the cause of pitting in a stand-by boiler at the generating station of the London Electric Supply Corporation proved that the sulphur in the metal is also a factor that must be taken into account. In these boilers, the pitting assumed serious proportions about two years ago, and an increase in the proportion of alkali, caustic soda, in the water proved to be useless in lessening the evil. On examining the boilers, numerous blisters were seen, varying in size up to 30 mm. in diameter; the bulk of them being in the neighbourhood of the water-level. On pricking the blisters, each was found to contain a liquid with a fine, black powder in suspension, and a pit was forming in the centre of each blister. As it appeared probable that the examination of this liquid might throw some light on the corrosion, a large number of the blisters were pricked, the fluid collected, and kept from contact with air. This liquid, which was strongly acid to litmus paper, was filtered in an atmosphere of carbon dioxide, and proved to consist of a solution of ferrous sulphate with a slight excess of sulphuric acid; the latter being either free acid or possibly ferric sulphate. The boiler water in which the blisters had been submerged was slightly alkaline, containing 0·635 lb. of caustic soda per 1000 gallons. As the blister fluid available only amounted to 25 grammes, its complete analysis was not possible. It contained 2·315 grammes per litre of ferrous sulphate, and within the limits of experimental error practically all the iron was present as ferrous salt. The total sulphate, expressed as sulphuric acid, was 1·92 grammes per litre; the total sulphate in the boiler water being 0·0608 gramme per litre—the ratio of the concentrations in sulphate inside and outside thus being 31·5 : 1. Assuming that the sodium sulphate was of the same strength both inside and outside the blister, the excess of sulphuric acid would still amount to 0·27 gramme per litre.

It is clear that the sulphur could only come from the steel, and the oxygen necessary for its oxidation from solution in the boiler water, and it seemed of interest to determine, if possible, how the oxidation takes place. It is well known that the sulphur in steel is present as manganese sulphide; ferrous sulphide only appearing when the quantity of manganese present is insufficient. If the sulphide is directly oxidized to sulphate by the oxygen in solution, and this is precipitated by the alkali in the boiler water, the substance of the blister and the black precipitate in suspension should consist mainly of oxides of manganese. If, on the other hand, the sulphide on oxidation gives rise to free sulphuric acid, the corresponding amount of oxide of manganese remaining attached to the plate, then this acid will act on the whole portion of the metal within the blister, and the precipitate will contain the various constituents of the metal in proportions roughly corresponding to those existing in the boiler-plate. This would also be the case if, a little ferrous sulphate once formed, oxidation to ferric sulphate took place at the expense of the incoming oxygen. This ferric sulphate would be reduced by the metal of the plate, and the scale would have the same composition as in the attack by free acid.

The analysis of the scale gave the following figures (percentages): Iron, 65·92; manganese, 0·28; carbon, 0·50; sulphate (SO_4), 3·71; silica, 0·65; calcium, 1·10; moisture, 3·40; oxygen (by difference), 24·44. In spite of the precautions taken to exclude oxygen during the washing and drying, it is probable that some oxidation took place, increasing the proportion of ferric oxide. The above analytical figures are consistent with the following percentage composition for the scale: Mn_3O_4, 0·39; $CaSO_4$, 3·74; Fe_3C, 7·56; SiO_2, 0·65; $FeSO_4$, 1·70; Fe_3O_4, 18·00; Fe_2O_3, 64·56; water, 3·40. [The water represents the amount left after drying in a vacuum, at the ordinary temperature, over phosphorus pentoxide.]

The proportion of manganese does not correspond with what would be expected if manganese sulphate were the first oxidation product; but the figures agree fairly well with the hypothesis of the action of dilute sulphuric acid or ferric sulphate—the products being then precipitated by the alkali of the boiler water. As in a stand-by boiler the liquid has periods of rest, the oxides deposit on the spot where they are formed, giving a coherent membrane. Under these conditions, this acts as a sort of semi-permeable membrane, admitting oxygen but not alkali; and thus giving rise to the anomalous effect of an acid corrosion going on inside an alkaline boiler water.

The presence of streaks of sulphide in the steel thus gives a complete chemical explanation of pitting in the case of a stand-by boiler, and may also serve to explain the corrosion of steel plates along definite lines in experiments in which the liquid has not been kept agitated. It was formerly supposed that, provided the sulphur in steel was completely combined as manganese sulphide, the injurious effects on the strength of the steel were minimized. Metallographic evidence has lately been accumulating tending to prove that many fractures follow the lines of manganese sulphide. The facts noted above as to the chemical properties of manganese sulphide form an additional argument for excluding it from steel as far as possible.

It may be of interest to note that the substitution of an alkaline arsenite for caustic soda in these boilers completely stopped the trouble; no blisters having developed during the last two years—an effect possibly due to the oxidation of the arsenite by the dissolved oxygen.

Liability for a Water-Meter Damaged by Frost.

At the April sitting of the Windsor County Court, his Honour Judge Rowland Roberts had before him a case in which the Slough Water Company claimed damages from Mrs. Fisher, a consumer, for the destruction through frost of a meter which was rented by her. It was explained that, according to the regulations, consumers were held liable for damage to meters. In April, 1900, the defendant's attention was called to the bad state of the meter-box; and about Christmas last year, when the Company's servant went to take the meter-reading, he called the attention of Mrs. Fisher's caretaker to the fact that the box required packing with straw to preserve the meter from frost. This was not done; and as a result of the extreme frost, the meter was damaged. The defendant was written to in January this year calling attention to the fact; and in a reply she wrote denying neglect and repudiating responsibility. Upon this a sum was claimed of £5 15s., being less than the full value of a new meter. A reply was received that, as £12 had been paid annually for some years without the premises being occupied, she would resist the claim. Ultimately directions were given by the Company to discontinue the supply; and it was cut off. Defendant had paid the water-rent; and the only question was the damage to the meter. For defence, it was urged that the meter suffered from old age; and that the damage by frost was not due to the state of the box. His Honour, after a lengthy summing up, in which he criticized the Company's regulations, said the question was whether at common law there was evidence of negligence; and he came to the conclusion that the defendant was responsible for the condition of the meter chamber. He therefore gave judgment for the Company; but he thought the damages claimed were excessive, seeing that the meter was at least fifteen years old. He awarded the Company the sum of £3 10s., with costs on the ordinary scale.

Reduction in Price of Gas at Prescot.—The Directors of the Prescot Gas Company have, as from the commencement of the current quarter, reduced the price of gas from 3s. 9d. to 3s. 4d. per 1000 cubic feet, less 10 per cent. discount. The charge for gas used in engines is now 2s. 11d., less 10 per cent. In the case of fires, the Company have arranged to fix, on request, a "rebate indicator" for which a quarterly rental of 3d. will be charged. All gas passed through this indicator will be charged at the rate of 3s. per 1000 cubic feet, less 10 per cent. discount.

Gas and Water Profits at Coventry.—It was mentioned by Alderman J. Maycock, when presenting to the Coventry Town Council the half-yearly estimates, which provided for an increase of 3d. in the pound in the rates, making them 7s. 10d. for the year, that in the previous six months there had been a contribution of £1000 from the gas profits. The amount to be received out of the water-works profits was £2250, against £2000 last year. It was proposed to spend £1000 in tar-sprinkling and other chemical appliances, in addition to the ordinary expenditure on street watering.

REGISTER OF PATENTS.

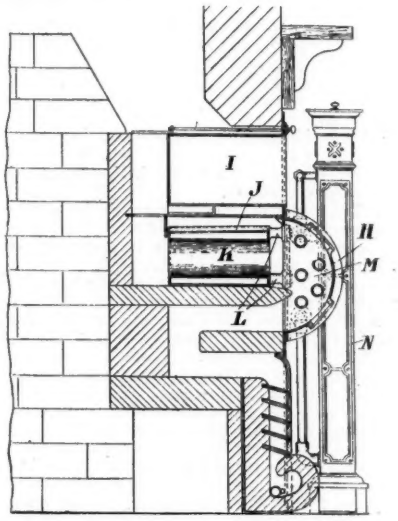
Heating Rooms by Combustion of Gas.

HISLOP, GEORGE R., of Paisley.

No. 4008; Feb. 22, 1908.

This invention has for its object the heating of rooms by combustion of gas in a fire-chamber comprising a grate or the like, placed at or near the floor, in which the gas is burned (preferably on the bunsen principle), and made to impinge upon artificial fuel in front of a curved, corrugated, or ribbed brick back, behind which is an air space to prevent the conduction of heat into the brickwork; or, instead of artificial fuel, fretted or perforated iron bars may be employed, "so as to give out the maximum amount of radiant heat."

This is one of three applications which were merged into one complete specification, under section 16 of the Patent Act of 1907. The illustration shows the arrangement in which readers will be more particularly interested.



Hislop's Gas Heating-Stove.

With the view of utilizing the heat hitherto lost with gas-fires beyond the area of combustion, the products of combustion are caused to return to, and pass or circulate through, a semi-cylindrical or other form of casing H, placed immediately over the fire opening, and made "preferably of a material that will take up and radiate the largest proportion of the heat in the waste gases." The casing is fitted with metallic tubes terminating in attached water-boxes or chambers at both ends of the casing, which is also provided with self-sealing doors that can be readily removed for inspection or cleaning purposes; or the projecting casing may itself be a boiler and radiator, with or without tubes. In addition to the casing, a water-boiler J, inserted in the flue adjacent to the chimney, may be provided with a flue K, through which the waste gases are passed; or the gases may be passed around the boiler, which is connected at L to the water-boxes M.

The boiler-chamber is preferably formed of tiles or metal plates (but for the crown of the chamber metal plates are preferably used), in order to provide a smooth and level bed and form a hot-air chamber or recess in the upper end of the grate under the fire-place lintel. In this chamber or recess is fitted a drawer-like casing I, having a flange forming a joint against the face of the grate, and capable of ready removal for inspection or chimney cleaning purposes.

The casing I is provided along the top and bottom with adjustable or closeable openings to permit circulation of hot air through the casing and into the room; or it may be adapted to contain articles of food to be cooked or heated. The back or inner end of the casing is formed of thin metal; and the waste gases, after leaving the projecting casing H and the boiler J, impart to the back of the casing a further and final portion of their heat before entering the chimney. A damper is introduced for controlling the exit of the waste gases.

The casing H is connected with a radiator N, or radiators conveniently placed (preferably) upon either side of the fire and in front of the grate, through which water is caused to pass. Provision is made for the evaporation of this water, and for drawing off hot water if required; and instead of, or in addition to, the radiators on the fire hearth, outflow and return pipes may be laid around the room, or may be led to, and returned from, other radiators, or a drying coil or the like as desired.

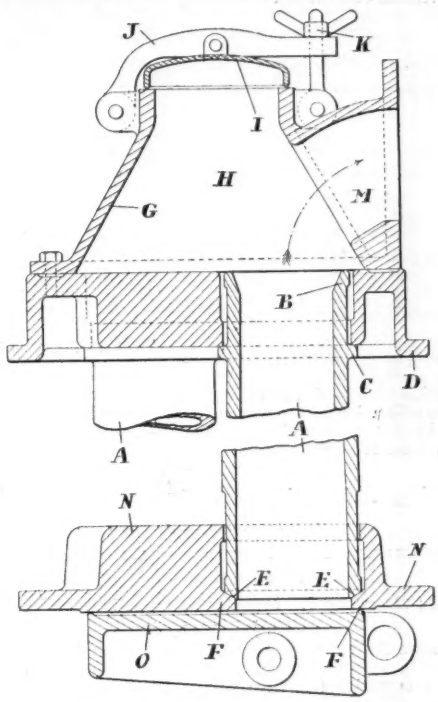
Destructive Distillation of Coal.

PARKER, T., of Coalbrookdale, Salop.

No. 4266; Feb. 25, 1908.

This invention relates to apparatus for the destructive distillation of coal, and is more especially intended for the partial destructive distillation of coal according to the process described in patent No. 14,365 of 1906. It has for its object "to provide apparatus of simple construction in which the process of distillation may be quickly carried on so as to yield a very considerable output of partially coked residue"—"coalite."

The inventor provides batteries of tubes vertically disposed and carried within common top and bottom fittings. The top fitting is provided with a series of apertures for the reception of the ends of the tubes; and centrally above the series of tubes is the charging aperture within a surmounting hood, so that all the tubes may be filled from the same charging aperture. At the side of the hood or fitting is the outlet for the gas. A corresponding common bottom fitting receives the ends of the tubes, and there is mounted beneath a common discharging door, conveniently hinged to the fitting and provided with mechanical means to effect its opening and closure, so that the contents of all the tubes in the unit or battery may be discharged.



The Coalite "Battery" of Vertical Retorts.

The illustration shows (in section) the top and bottom fittings employed for a unit battery.

The upper extremity of the tubes A is provided with an outwardly extending shoulder B and a laterally extending flange C some little distance below the extremity, so as to engage the under side of the top fitting D. There is a clearance between the end of the tubes A and the aperture in the fitting D into which luting may be introduced so that the ends of the tubes may be secured in position.

The tubes are advantageously provided to taper, with a bore at their upper extremity of about 4½ inches in diameter, to a diameter of about ½ inch more; and the lower extremity of the tubes is advantageously formed with a conical face E for the reception upon a corresponding conical face in an inwardly extending flange F provided in the aperture of the bottom fitting N.

Upon the top fitting is a hood G, which contracts inwardly towards its upper extremity, leaving an aperture H sufficiently large for the charging of the several tubes A. This aperture is closed by a door I securely clamped with a gas-tight closure by means of lever J and bolt and nut fitting K in the usual way. Laterally in the hood is formed an outlet M for the gas, which passes up from all the tubes of the unit.

A discharging door O is hinged to the bottom fitting N, which door O is common to all the tubes of the unit battery, and may be provided with mechanical means to effect its opening and closing as required.

The patentee claims: "Apparatus for the destructive distillation of coal and other carbonaceous substances, consisting in combination of a battery of taper tubes mounted in a common top and bottom fitting, with a single hood and charging aperture in the common top fitting for all the tubes in the unit or battery, as well as a common outlet for the gas therefrom, and a hinged discharging door as described and illustrated."

Coke-Ovens.

COKE OVENS AND BYE-PRODUCTS COMPANY, LIMITED, and WELLINGTON, S.N., of Palace Chambers, Westminster. S.W.

No. 6223; March 20, 1908.

This invention relates to regenerative inclined coke-ovens, arranged in a battery side by side with their discharge ends opening on to a bench or other receiver for the finished coke, and in which the opposite ends of the ovens are provided with doors for the purpose of charging. The object of the invention is to construct the ovens so that they shall "be particularly suitable for use for the production of gas from coal, as well as for the production of coke or smokeless fuel, so that greater control is obtained over the heating of the charges, so that one portion of a charge is not unduly heated while another portion is under heated, to effect great economy in the heating, and to make the greatest possible use of the heat of the waste gases, and to so construct the various portions of the ovens that unequal heating of the structure is prevented, and the various flues and chambers are readily accessible for inspection purposes, or for repairing when necessary."

The arrangement referred to, and the working results attained by its use, formed the subject of an article communicated to the "JOURNAL" on April 21 last year, pp. 152-53.

Supporting Grid Bars in Gas-Purifiers.

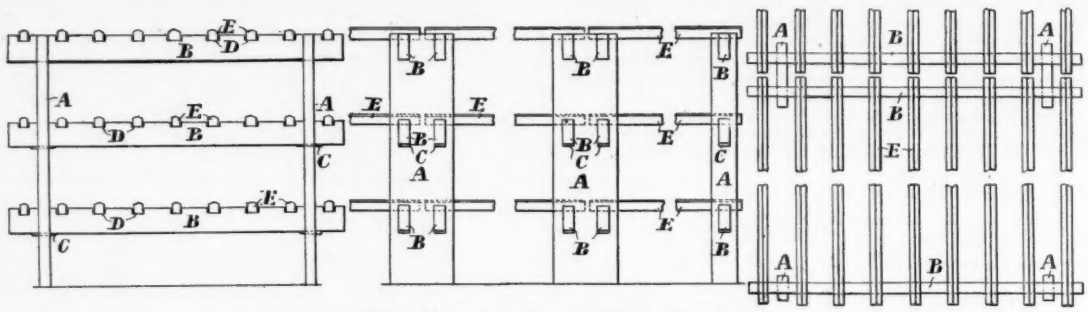
KIRKHAM, HULETT, AND CHANDLER, LIMITED, and HERSEY, S., of Palace Chambers, Westminster.

No. 9384; April 30, 1908.

The illustration shows an end view of a series of grids with their supports according to this invention; also a side view and a plan.

The invention consists of constructing trestles of wood or other suitable material, each consisting of two vertical supports A, which have passed through them at different levels supporting bars B (bearers), fixed in the vertical supports—for instance, by means of wedges C, and being notched as at D. In these notches are laid the bars E, advantageously also of wood, which form the grids. In some cases the notches may be wide enough to receive two grid-bars the ends of which overlap.

In practice, all or some of the grid-bars of the upper and lower tiers may be made deeper than those of the other tiers, and be provided on



Kirkham and Hersey's Purifier-Grid Supports.

the underside with notches, so that the bars are locked against movement in one direction by the notches in the bearers, and in the other direction by notches in the bars themselves—this arrangement serving to brace the series of trestles.

Recovering Ammonia from Gases Produced in Dry Distillation.

ACTIEN-GESELLSCHAFT FÜR KOHLENDESTILLATION, of Gelsenkirchen-Bulmke, Germany.

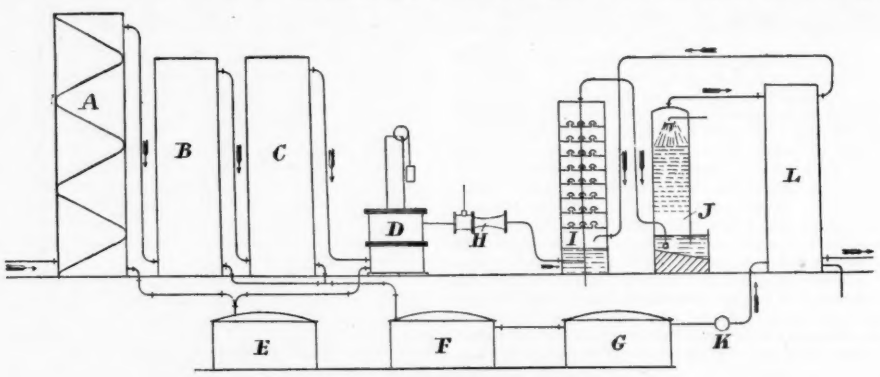
No. 26,027; Dec. 2, 1908. Date claimed under International Convention, July 10, 1908.

Referring to the accompanying diagram, the gas from the retort or oven passes into the helical condenser A, giving up the greater part of its tar in a condition free from water. The gas then traverses the water-tube condensers B and C and the tar-separator D. The tar from A and D is collected in the reservoir E, and the tar and ammoniacal liquor from B and C pass to the reservoir F, whence the ammoniacal liquor flows to the reservoir G.

The steam-ejector H draws the gas through the condensers and tar-separator and forces it, in a condition free from tar, into the ammonia still I, and thence to the saturator J and its tower extension to the last condenser, whence it passes to the outlet pipe.

The ammoniacal liquor as collected in the reservoir G is lifted by the ejector pump K and forced through the condenser L and pipe to the ammonia still I. Here it is mixed with lime in the usual manner, and the ammonia is driven out of the water by the hot gases flowing through the still. The hot gases carry the ammonia into the saturator J, pass through the acid in the latter, and rise upwards through the tower extension, which is lined with lead and filled with an acid-proof material, down which the sulphuric acid flows. The ammonium sulphate which separates, collects at the bottom of the saturator, and is either fished-out or blown-out by the steam-ejector.

The advantages of this process are said to reside in the facts: (1) That scrubbing towers with their irrigating pumps, and large reservoirs are not required; (2) that space and buildings are economized;



A German Ammonia Recovering Plant.

(3) that, owing to there being no mechanical parts, no lubricant, &c., is required; (4) that by the use of the exhaust steam from the ejectors for heating the gases and ammoniacal liquor, and by not using fresh steam for the irrigating pumps, ammoniacal liquor pumps, rotary gas-exhausters, and still, only a small quantity of steam is required; (5) that by completely using the heat of the steam the cost therefor is minimized; (6) that the ammonia is completely expelled in I and absorbed in J; (7) that the demand for fresh water is diminished, and the amount of waste water is considerably reduced; and (8) that the number of attendants required is reduced by more than one-half.

Gas-Meters.

MERCER, A., of Longsight, Manchester, and METERS LIMITED, of Deansgate, Manchester.

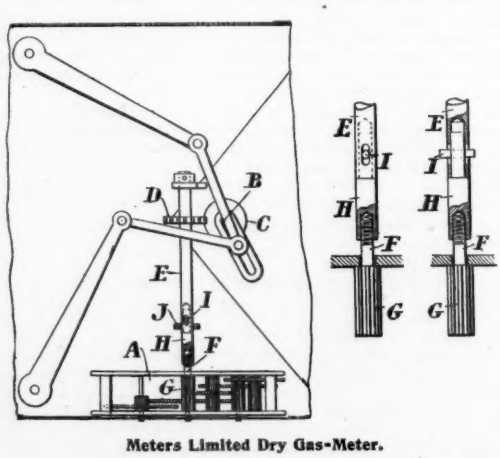
No. 14,239; July 4, 1908.

This invention, relating to dry gas-meters, refers to means for connecting the main actuating spindle of the registering mechanism to the meter mechanism, so that the former can be readily detached from the latter for testing or like purposes.

The illustration gives a sectional plan view of the upper portion of a meter with the invention applied thereto, and two detail views.

The registering mechanism A is arranged in the upper part of the casing, which is partitioned off from the portion containing the usual measuring mechanism; the spindle or equivalent part B of the latter, which drives the indicating mechanism, projecting through the partition. The spindle drives, by means of a worm C and worm-wheel D, an intermediate spindle E adapted to be detachably connected to the spindle F carrying the main pinion G of the indicating mechanism.

Heretofore the intermediate spindle has been detachably connected to the main pinion by a pin upon the main pinion entering a cross cut or slot in the end face of the intermediate spindle. But with this



Meters Limited Dry Gas-Meter.

arrangement, unless the pin and slot or groove align with one another, the act of trying to place the pin in the groove sometimes bends the

bracket supporting the end of the intermediate spindle, and moves the worm and worm-wheel out of engagement with one another.

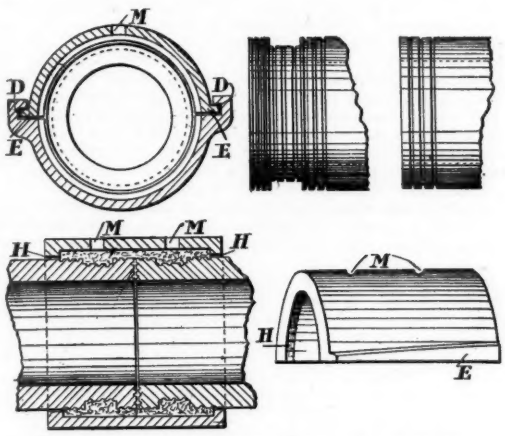
According to the present invention, means are provided whereby the pinion and intermediate spindle are readily brought into driving connection with one another when the indicating mechanism is placed accurately in position. In the form illustrated, the spindle F, carrying the pinion G, is screw-threaded and, when the indicating mechanism is in its correct position, is co-axial with the end of the internally-threaded link or connecting member H. Thus, on turning the finger secured upon the front end of the spindle, the latter screws into the link. A reduced portion of the link enters the end of the intermediate spindle E, to which it is secured by a pin I and slot or equivalent device; so that, while the link H and spindle E must rotate together, they are capable of longitudinal movement relatively to one another. The screwing of link H and spindle F therefore does not affect the position of the intermediate spindle E by imparting a longitudinal movement to it. The end of the intermediate spindle is held in correct position for engagement by the screw or other device upon the driving spindle of the indicating mechanism by a bracket J arranged near the end.

Pipes to Stand High Internal or Severe External Pressure.

CLARK, R. O., of Hobsonville, New Zealand.

No. 10,751; May 18, 1908. Date claimed under International Convention, May 18, 1907.

This invention relates to joints of pipes made of earthenware that may be used in place of iron or steel pipes in the construction of gas and water mains, "and the objections incidental to such metal pipes may be avoided." The meeting pipe-ends are of equal diameter, and are surrounded by a separate socket, in one or more parts, so as to leave an annular space between the outer sides of the pipes and the inner sides of the socket for receiving and holding cement filling or the like.



High-Pressure Gas and Water Mains of Earthenware.

The pipes (as shown) are made of a thickness varying from one-and-a-half to four or five times the thickness of ordinary earthenware pipes, which vary from ⅜-inch to 2 inches in thickness, according to the diameter of the pipe. The ends are formed with narrow and with wide circumferential grooves at the base. This arrangement ensures a good connection between the pipe ends and the grouting or cement filling. The pipe-ends are also formed with concentric grooves in their meeting faces, where they butt together, to hold cement and ensure a good junction.

The socket is made in upper and lower half-parts, respectively formed of a semi-circular cross section throughout the length, and with a longitudinal tongue E, and a longitudinal groove D, which are adapted to slidably engage with one another, as will be readily understood on referring to the engraving. The tongues and co-acting grooves are made of a tapered formation, so as to cause the socket parts to be held tightly together when slid into position. The socket is formed with internal lips H or lugs, so that when the halves of the socket surround two butted pipe-ends, an annular chamber is formed for receiving grouting or cement filling, which may be inserted through apertures M to make the joint tight.

In forming a joint, cement is placed on the end faces of the two pipes, which are then butted together and laid on the lower half of the socket. The upper half is then slid into position, and the grouting is introduced through holes M until all spaces are filled.

Rhyl Gas-Works Loan.—Mr. S. Perks has informed the Rhyl Urban District Council, with reference to a gas loan of £4183, that through the tact of their Engineer (Mr. L. G. Hall), and also a reduction in the price of iron and steel, they were able to reduce the amount of the required outlay by £585. He moved that the Local Government Board be asked, as soon as possible, to reduce the loan by this sum. The motion was carried.

Gas Discounts at Belfast.—At a recent meeting of the Belfast Gas Committee, Alderman James Craig brought forward the question of gas discounts, and pointed out that at present consumers using up to 400,000 cubic feet per annum were entitled to a discount of 15 per cent., while those consuming over this quantity were receiving a discount of 20 per cent. In order that the discounts should be equalized over all consumers, he moved that the discount of 15 per cent. be increased to 20 per cent. The motion was carried; seven voting for, and four against.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Mountain Ash Urban District Council Bill, Northallerton Water Bill, Swinton and Mexborough Gas Board Bill.

Bills read the third time and passed: Bungay Water Bill, Donington Water Bill, Frimley and Farnborough District Water Bill, Grantham Water Bill, Worksop Water Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill brought from the Lords, read the first time, and referred to the Examiners: Worksop Water Bill.

Lords Bills read a second time and committed: Clevedon Water Bill, Heckmondwike and Liversedge Gas Bill.

Bills read the third time and passed: Mountain Ash Urban District Council Bill, Northallerton Water Bill, Swinton and Mexborough Gas Board Bill.

The consideration of the Gaslight and Coke Company Bill, as amended, which was down for last Tuesday, was deferred till to-day. The Bill is being opposed by Mr. Thorne, who will move its rejection.

YORKTOWN AND BLACKWATER GAS BILL.

House of Commons Committee.—Thursday, April 22.

(*Before Mr.* ROSE, *Chairman, Major* RENTON, *Mr.* AGNEW, *and Mr.* C. HARMSWORTH.)

This is a Bill by which the Yorktown and Blackwater Gas Company ask for, among other things, authority to supply electricity and for further powers. They also desire to change the name of the Company.

Mr. BALFOUR BROWNE, K.C., Mr. VESEY KNOX, K.C., and Mr. HENRY LYNN appeared on behalf of the promoters; Mr. HONORATUS LLOYD, K.C., Mr. C. C. HUTCHINSON, and Mr. JEEVES represented the Aldershot Gas and Water Company, who petitioned against the Bill. Mr. JEEVES also appeared on behalf of the Easthampstead Rural District Council.

Mr. BALFOUR BROWNE, in opening for the promoters, said this was a Bill to enable the Yorktown and Blackwater Gas Company to supply electricity. Further powers were also requested; and it was desired to change the name of the Company. There was another Bill before the Committee promoted by the Aldershot Gas and Water Company, to extend their limits of gas supply, to empower them to construct additional water-works, to supply electricity, and to change their name. They were competing Bills, and so would have to be taken together. One of the objects of the first Bill was to extend the gas supply limits of the Yorktown Company; and they sought to repeal certain powers of the Aldershot Company over an area which they had never supplied, and which the promoters were now supplying. The Yorktown Company were seeking powers to supply electricity in the district of Frimley and such other parishes as were within their gas limits. They also sought authority to repeal powers of the Camberley Electric Supply Company in an area which they had never supplied, and which was covered by the gas area of the promoters. In order to carry out this work, they proposed to raise an additional capital of £50,000, and to borrow £16,666. The Company was formed in 1859, with a capital of £1500, for the purpose of supplying gas to Yorktown and Blackwater. In 1866, the Aldershot Gas and Water Company was incorporated; but there was at that time a concern known as the North Camp Gas Company, who were authorized to supply Frimley. This Company and the Yorktown Company had concurrent powers to supply gas; but the former had neglected to supply a certain area. There was also the Ascot Gas Company; but they, too, had not supplied in the area of Sandhurst, Ash, or Normandy. The Aldershot Company were now seeking to repeal the powers of the Ascot Company to supply gas in Ash and Normandy—they were doing there exactly what the promoters were doing in the Yorktown area. The promoting Company had made great progress since their formation; and in 1900 they applied to the Board of Trade for an extension of their limits of supply. The Confirmation Bill was opposed by the North Camp Company; and, after negotiations, an agreement was come to which limited the North Camp Company to a certain area. The two Companies were not to interfere with each others area. The Yorktown Company, however, had power to supply gas in bulk beyond the limits of supply. In 1900, the Aldershot Company obtained additional authority to supply; and in 1901 they acquired the undertaking of the North Camp Company. In 1900, an agreement was come to between the Yorktown Company and the Aldershot Company for the sale of the undertaking to the Aldershot Company. This agreement provided that the sum to be paid for the concern was £16,000. A Bill was promoted in 1901 to carry out the terms of the agreement; and the House of Commons passed the measure authorizing the purchase. In the House of Lords, however, the question was raised that competition in gas was bad, and that it would be well for the competition to cease. The result was that the purchase did not take place. In 1903, the promoters were asked to make an offer to supply gas to Sandhurst. Up to this time the War Office had been making and using their own gas; and they invited tenders for a supply to the Royal Military College. The Aldershot Company also tendered; but the offer of the promoters was accepted. The War Office entered into an agreement with them; and they had

been supplying gas ever since. At that time, they went outside their area of supply; but under the Act of 1903, Sandhurst was brought within the area. In that year, the Aldershot Company promoted an Order before the Board of Trade. The Yorktown Company opposed this, because they had the fear of the Aldershot Company competing with them in Yorktown. The result was that a clause was introduced which provided that it would not be lawful for the undertakers to expend or apply any part of their capital, or of the money belonging to the undertakers, for the purpose of affording a supply of gas in any part of the district within which the Yorktown Company were authorized to supply. In certain places where the Aldershot Company had powers to supply, they had failed to do so; and the promoters were now asking to have these powers repealed *in toto*. The promoters had been in communication with the War Office; and the modifications they had suggested in the Bill had been complied with. On the question of repealing of powers, Counsel called attention to the Draycott Bill of last session, where the position was very similar to the present case. This was a district where nothing had been done, although powers had been given 32 years ago. With regard to the petition of the Easthampstead Rural District Council, they objected to any powers being given in reference to the supply of electricity in their district. The Yorktown Company worked under the sliding-scale; their dividends increasing as they reduced the price of gas. If it should be one of the results of the investment in electricity that they reduced their profits, they would be the primary sufferers; and if the effect was to increase the price of gas, their dividends would go down. There were good reasons why the two businesses should be conducted as one. They did not think it would be possible to raise money for electricity alone; and they believed they could raise the capital on the ordinary stock of the Company on easy terms. From the point of view of the gas shareholders, there was an advantage in securing themselves against the competition of some outside electrical undertaking. The only other petition was that of the Aldershot Company.

Mr. *Alfred H. Claypole*, the Chairman of the Yorktown Company, in giving evidence in support of the Bill, said that in 1904 they were made a sliding-scale Company, with a standard price of 4s. 3d.; and the capital was raised to £50,000. Since then the capital expenditure had been very greatly increased. In 1903, the share capital expended was £13,000, and the money borrowed £2405; whereas in 1908 the share capital expended was over £41,000, and the amount borrowed £9250. The consumption of gas had also increased from 2 million cubic feet in 1879 to 63 millions in 1908. In 1897, the price of gas was 4s. 6d.; and by gradual stages it had been reduced to 3s. 6d. They had been some considerable time without making a dividend; and it was only in recent years that they had been getting a handsome return. They were anxious that the area of supply should be defined, so as to prevent the possibility of conflict; and they were wishing to give a supply of electricity with a view of meeting the desires of their customers and to move with the times.

Replying to Mr. JEEVES, witness agreed that the Easthampstead Council were the local authority for the larger part of the existing area of the Yorktown Company. Between £20,000 and £30,000 of the capital would be required for the electricity extension. If the electrical undertaking was worked at a loss, the Company would pay it out of receipts from the gas consumers.

Mr. JEEVES: Suppose it just manages to pay its way, but does not earn enough to pay the same rate of dividend as the gas capital earns, I suppose you would pay the dividend on the electrical capital out of moneys received from the gas consumers?

Witness: Probably that would be the case at first.

Asked if he thought it fair that people living in the Crowthorne parish should be subject to liability to pay moneys in respect of an undertaking that did not benefit their district at all, witness held that they were sharing the benefits of the profits of the Company in the past. He agreed it might happen that if the electrical undertaking were not worked at a profit the gas consumers would have to find 1 per cent. on the amount of the capital employed in the electrical undertaking.

Mr. JEEVES: Is not the sole reason for seeking to mix up the two the fear that there may be a loss on the electrical undertaking, and it will not be easy for you to raise the capital separately?

Witness: We admit that there may be a loss.

In cross-examination by Mr. HUTCHINSON, witness said that the Staff College which his Company were supplying was within the area of the Aldershot Company, in which area they were not to supply without consent. They had not got that consent.

Mr. HUTCHINSON: As a matter of fact, did not the Aldershot Company, either at the end of last year or the beginning of this year, complain that you were acting *ultra vires* and supplying gas without their consent?

Witness: Yes.

Did not the Directors of the two Companies meet, and was it not agreed that the Aldershot Company were supplying without consent, and acting *ultra vires?*—The proceedings were without prejudice.

Is not there an action pending against you by the Aldershot Company, alleging that you were acting unlawfully?—Yes.

Is not this the reason you have now come to Parliament, to relieve you from the consequence of your wrong-doings?—Certainly not.

What reason is there?—To protect ourselves.

Friday, April 23.

When the Committee resumed their sittings this morning, evidence was given by

Mr. *E. H. Stevenson*, who said that the gas undertaking of the Yorktown and Blackwater Company had expanded at an exceedingly rapid rate during the past six years. The main expansion took place in 1903-4, which was largely due to the supply of gas to the Staff College. In the last five years, the increased consumption had been 5¼ per cent. The two main objects of the Bill were to extend the limits of supply, to which there did not appear to be any opposition from local authorities, and to take into their extended limits a small area which they had supplied but which the Aldershot Company had never supplied. The capital of £50,000 was a reasonable amount to ask for, having regard to the growth of the district. With regard to the gas portion, the capital would only last probably seven years. The small area to which he referred was situated in the Aldershot Company's limits; but that Company had never supplied a single foot of gas there, whereas the Yorktown Company had been supplying the whole of the area for seven years under the War Office contract. It was reasonable, and the practice of Parliament, to say that, where a company had power to supply but had never supplied, they should be turned out of the district. There were a number of cases where Parliament had protected gas companies against competition from other companies and local authorities who had statutory powers but had failed to exercise them. About 20 per cent. of the gas supplied by the Yorktown Company was taken by the War Office. The Easthampstead Council appeared to think that if the gas and electricity undertakings were under one control the people in the district would have to pay more for the gas; but he was sure that economy would be the result of such control. It would tend to a reduction of the price of gas, and there were obvious economies that would be to the benefit of the gas and electricity undertakings. The Company would be able to obtain their capital much more cheaply, because if they went into the market with merely an electrical undertaking, there would be no security at all. He was sure the gas consumers would not suffer.

In reply to Mr. HONORATUS LLOYD, witness said it was important that the promoters of the Yorktown Bill should be empowered to turn the Aldershot Company out of the area in which they both had powers, which he agreed would take away from the Aldershot Company the right to compete for the War Office contract. If this were done, the War Office would get their gas quite as cheaply; and they were open to manufacture for themselves at any time. Before the matter reached the next House, he believed the Yorktown Company would enter into definite arrangements with the War Office. The Yorktown Company had been in possession of the area in question for forty years, and they ought now to have the protection of Parliament. Competition was a good thing for the consumers, that in the present circumstances, the War Office were on velvet. With regard to electricity, he agreed that they were seeking power to supply outside their own gas limits and inside the gas limits of the Aldersbot Company.

Replying to Mr. JEEVES, witness said that, taking a rate of increase of 10 per cent., which would mean 200 million feet of gas, in the next 15 years £150,000 would be required for gas. He admitted they were only asking for £50,000 for gas and electricity, with borrowing powers; but they had £18,000 in hand. He denied that they were trying to exclude competition in electricity, because if they did not exercise their powers they would lose them. The area they were seeking to supply with electricity covered only a fiftieth part of the district. He did not agree that if there was a loss on the electric undertaking it would have to be borne by the revenue of the gas undertaking. It would certainly have to be borne by the shareholders. Counsel having remarked that any loss on the electricity undertaking would have to be borne in the proportion of £200 by the public and £100 by the shareholders, witness held that if the Company got their powers it would tend to a reduction in the price of gas, and would operate to the good of the people in the district. It was a good thing in the long run, from the point of view of the Company and the consumers, that they should be freed from the risk of competition in electrical undertakings. If the consumer did not benefit, the Company would not benefit.

In reply to the CHAIRMAN, witness said that, with regard to the area in question, it had never been worth the while of the Aldershot Company to lay mains in it.

The CHAIRMAN: You are fighting for the War Office contract?

Witness: Yes; it is of such importance that it would do great harm to us to lose it. If it were lost to us, it would certainly increase the price to the general consumer. The income from this contract is about £2000 a year, and it thus carries a considerable portion of the standing charges.

Mr. *Arthur Valon* (Messrs. W. A. Valon and Son) generally corroborated the evidence given by Mr. Stevenson. He had examined the works of the Yorktown Company and found them in very good condition. The works were capable of producing 217,000 cubic feet of gas per day; and there was a good margin of retort power for future requirements. Between the years 1891 and 1901, the population had increased by about 40 per cent.

Mr. *S. Sellon* stated that the scheme was a sound one, so far as the electricity portion of the Bill was concerned. It would not be feasible to carry out an electricity supply unless it was coupled with the gas supply; but if the two supplies were associated, the undertaking would be remunerative.

Further consideration of the Bill was adjourned till yesterday.

Strange Gas Poisoning Case at Bradford.—Mr. William Barber, a Bradford merchant, is reported to have met his death in a curious manner on Monday of last week. It is stated that he was at his office, and was occupying himself in endeavouring to trace a leakage of gas from a bracket, when the bracket collapsed, and a sudden outburst of gas took place in his face. Mr. Barber seems to have inhaled the gas; and the effect was to render him at once unconscious. A warehouseman in his employment had occasion to go into the office and found him, and at once summoned police aid. Two constables tried artificial respiration for a considerable time, but without effect, and a medical man who was called in pronounced life extinct. Mr. Barber was sixty years of age.

Unprofitable Electricity at Morecambe.—In the Morecambe Town Council, Alderman Gardner referred to the continued losses on the electric light undertaking, and said that this year the Committee were asking for £2083 to meet the deficiency. He produced figures which showed that if the undertaking were worked in connection with the gas concern, the town would be saved something like £3000 a year. Under this arrangement, he said they could produce electric current at 1½d. per unit. Mr. Baxter remarked that the Electric Light Committee accounted for a portion of their losses last year through damage caused by a great flood. Did the Committee expect an earthquake this year? Alderman Carleton (Chairman of the Committee) said the Committee had schemes in hand for installing gas or oil instead of steam.

LEGAL INTELLIGENCE.

LIABILITY FOR WATER-RATES IN FLATS.

At the Westminster County Court last Thursday, the case of *Metropolitan Water Board v. Cannon* came before his Honour Judge Woodfall. It was a claim for 11s. 6d., being two quarters' water-rate, against the tenant of a flat at Cranworth Gardens, Brixton. The case was a test one, in which the decision was to be accepted by a number of tenants in the same district.

Mr. A. B. SHAW, who appeared for the Board, said this was the first in a long series of actions which were adjourned pending the decision of the present case. It was admitted by the defendant that he was in the occupation of the flat, and that water was supplied to it. A house agent had always paid the water-rate for the flats in Cranworth Gardens up to the date of the rate sued for; but when he was applied to, he referred the Board to a firm acting as receivers of the property. There was no satisfaction; and the Board proceeded against the users of the water.

Defendant was called, and stated that his rent was "inclusive," and that he had paid the water-rate in his rent.

Mr. GIVEEN (instructed by Mr. George Kebbell), for the defendant, said the case was a far-reaching one for owners and occupiers of flats. At the time of the commencement of the service, the names of the tenants were unknown to the suppliers of water, and the agreement was made with the agent, who paid the rate and was applied to by the Board for payment. There was a perfectly good agreement with the agent, and the tenant could not be called upon to pay as long as the agreement was in existence. Notice had been given by the Board that the "farming" agreement was to be determined; but he submitted that this notice, which was one to the owner, was not a good one. If the Board were right, tenants of flats might find themselves liable to pay again water-rates which they had already paid in their rent, and for which they had never received application—this having been made to the landlord.

Mr. SHAW said the tenant would have his remedy against the person he had paid. Under the Board's Act of 1907, these "farming" agreements could not be made—they would be *ultra vires;* and the notice referred to was one intimating that these agreements were to be determined on a specified date. Forrest Fulton's Act did not apply in this case, as the rateable value of the premises was more than £20—being £23.

His HONOUR said the point involved was one of considerable importance, but he found no difficulty in arriving at a decision. The defendant, like hundreds of other people residing in flats, had an agreement with the landlord, under which the latter was to pay the rates, including the water-rate. Because the landlord did not pay, the Board had come down upon the consumer, who, no doubt, was liable. The consumer said he was not, because of the agreement with his landlord. The first thing to observe was that the Board were not a party to the agreement, and they were not affected, except by Forrest Fulton's Act. Under the Board's Act of 1907, circular notices were sent out terminating these "farming" agreements; and a point had been taken that the notice was not good because it made quarter-day the 1st of April instead of the 25th of March. The Board fixed a date to suit their own convenience; and he thought there was nothing in that point. Mr. Shaw had submitted that Forrest Fulton's Act did not apply, as it was passed for a certain class of small tenants. He (his Honour) found nothing in the Act to show that it was not applicable to the present case. There could be no doubt that, under the Act, tenants having an agreement with the landlord, as here, were protected against the supply of water being cut off if the landlord did not pay, and might deduct the amount of the rate from the rent. He gave judgment for the plaintiffs, with costs, and granted a stay of execution, in the hope that there would be an appeal. The other cases would stand over pending the decision as to an appeal.

Knocking Down Lamp-Posts at Liverpool.

At the Liverpool County Court last Wednesday, some cases were down for hearing in which the Corporation claimed damages from owners of vehicles for knocking down lamp-posts; but before they came on, the amounts were paid into Court. In regard to one of the cases, Mr. Swift said the claim was for only £1 19s. 8d.; but he asked for costs on the higher scale. The defendants were owners of motor omnibuses, and upon five days in July, August, and October last they knocked down lamp-posts belonging to the Corporation, or otherwise damaged them, by driving against them. When the Corporation complained, they appeared to set up a claim of right to do so, alleging that they were entitled to go along the roads, and that if the Corporation put lamp-posts in such positions as to render them likely to be knocked down, the owners of vehicles were not to be held liable, but that it was the business of the Corporation to remove them to places of safety—in fact, that it was the duty of the Corporation to put their lamp-posts in places of safety, and not the concern of drivers to avoid them when they were otherwise placed. He proceeded to refer to correspondence on the subject between the Deputy Town Clerk and an Insurance Company covering defendants' risks. In one letter, the Insurance Company stated that they had given the matter the fullest consideration; and they repudiated liability, leaving any further communications to their Solicitors. In these circumstances the Corporation decided to bring the claims into Court; relying on their Act, which gave them discretion as to where they should place their lamp-posts, and on the fact that there was nothing in law to give the driver of a motor omnibus, or any other vehicle, the right to knock the posts down. Mr. Proctor said the defendants did not claim any right to knock down lamp-posts; they simply repudiated liability. The ordinary law of negligence applied. Mr. Swift said the same lamp-post was knocked down three times. His Honour Judge Thomas remarked that the correspondence seemed to set up a suggestion of the improper placing of the posts, and that the defendants were going to set up that there should be some limitation on the Corporation putting the lamp-posts where they thought proper. The whole thing had been conducted as if it was to be contended that the Corporation had no right to select places for their lamp-posts, and that there was no liability on the part of the defendants for knocking them down. If this was so, it did raise a question of some general or public interest; and costs would be allowed on the higher scale.

Use of Unauthorized Water-Works.

In the Chancery Division of the High Court of Justice last Saturday, the case of *Attorney-General v. South Staffordshire Water-Works Company* came before Mr. Justice Neville upon a motion for judgment. Mr. Whinney stated that the action was brought by the Attorney-General, on the relation of the Rural District Council of Lichfield, for a declaration that a reservoir which had been constructed by the defendants was unauthorized and *ultra vires*, and for an injunction restraining the Company from using it. He explained that it had been decided in an action brought by the Attorney-General against the Farnborough Water Company that additional works could not be erected on land acquired by agreement; and an order had recently been made against the present defendants by Mr. Justice Warrington, at the instance of another District Council, after the case had been fully argued. (See "JOURNAL" for March 16, p. 796.) Since this decision, the defendants had agreed to withdraw their statement of defence in the present case, which was practically in the same terms as in the other, and to submit to a declaration that the works in question were unauthorized, and to an injunction restraining their further use. They also agreed to pay the costs. Mr. Sheldon, for the defendants, said he was willing to consent on the understanding that the injunction would be suspended until the second motion day at the Michaelmas sittings, as a Bill had been presented to Parliament to authorize these works. In the other action, Mr. Justice Warrington had suspended the operation of the injunction. Mr. Justice Neville made an order in the terms arranged.

Water for Fire-Hydrants in Theatres.

At the Westminster County Court, last Wednesday, before his Honour Judge Woodfall, the Metropolitan Water Board sued Mr. Mulholland for 12 guineas, being a year's rate for fire hydrants at his premises, the King's Theatre, Hammersmith. Mr. A. B. Shaw, who appeared for the Board, said their case was that hydrants were fixed at the theatre to meet the requirements of the London County Council, and, under an agreement with the West Middlesex Water Company, one guinea per annum was paid for each. The Board gave notice to terminate the agreement, and said the charges would be under their Act of 1907; but the agreement was one under which the ordinary supply was furnished for the dressing-rooms, &c. There were two distinctly separate supplies—the one for the hydrants being from the special high-pressure mains. There had been no notice to determine the hydrant agreement; and the Board could claim under it. Mr. Drucquer contended that the Act of 1907 provided for uniform charges and determined all agreements. Theatre proprietors were compelled to fix hydrants, and the Board were compelled to supply water for fire extinction; but a hydrant could not be charged for any more than a bath or a garden hose. The charge was for a supply of water, not for the instrument through which it would be utilized if required. Very little water was used in theatres, but they were rated under the Act of 1907 on the high rateable value of the building; and this was a claim for a further guinea a year for each hydrant in the theatre—hydrants which had not been used. His Honour thought it rather hard on the defendant; but he had to hold that the agreement was still alive. He gave the plaintiffs judgment, with costs; but a stay of execution was granted.

In the Chancery Division of the High Court of Justice last Friday, before Mr. Justice Eve, Mr. Stamp mentioned a motion in the action of *Morgan v. Tottenham and Edmonton Gas Company*. He said it was an action alleging a nuisance by running certain gas-engines. The defendants, for whom he appeared, had now moved the engines, and terms had been arranged with the plaintiff and signed by his Counsel. There would be a consent order in the terms agreed; defendants to pay the costs of the plaintiff.

Charge to Prepayment Meter Users in Manchester.—At a meeting of the Manchester City Council last Wednesday, Mr. Jennison proposed "That the Gas Committee be instructed to consider and report on the advisability of making the price of gas to consumers using penny-in-the-slot meters the same as to those using quarterly meters." He said the question concerned an enormous number of the poorer people in the city—in fact, some 60,000 people would be affected by the resolution. Alderman Gibson, the Chairman of the Gas Committee, said he had no objection to taking the matter back and considering it.

Tar Road-Painting Difficulties.—Difficulties (according to the "Daily Telegraph") have arisen in the matter of tar painting of the roads, which has proved such a boon all over the country to residents near main roads and to motorists. The Kent County Council are in a quandary, as one of the Local Government Board auditors has taken exception to the charges made for the work of tar painting. They have decided to approach the Local Government Board on the matter, as it is a subject of great importance all over Kent, where motor traffic is particularly heavy, and where the work should be now starting. However, in view of the expression from the auditor, if it is a reflex of the opinion of the Local Government Board, they would be surcharged all round if the work is done. Where Part III. of the Public Health Act has been adopted, application, it is stated, can be made to have the work done; otherwise application is necessary to the Local Government Board for permission to make tar painting a special expense on the respective parish, and in case of approval, the County Council could do the work.

MISCELLANEOUS NEWS.

GAS-WORKS SIDINGS AND RAILWAY RATES.

RAILWAY AND CANAL COMMISSION.

(*Before Mr. Justice* A. T. LAWRENCE, *the Hon.* A. E. GATHORNE-HARDY, *and Sir* JAMES WOODHOUSE.)

Corporation of Birmingham v. Midland Railway Company, London and North-Western Railway Company, and Great Western Railway Company.

Fourth Day.—Thursday, March 25.

This was a case in which the Corporation of Birmingham, who have constructed extensive private sidings at their Saltley, Nechells, Windsor Street, and Swan Village Gas-Works, asked for an order declaring them entitled to an allowance or rebate on charges made by the Midland, London and North-Western, and Great Western Railway Companies on inward and outward traffic to the various works. They also asked for a declaration that the London and North-Western Company had exceeded their maximum charge for the use of trucks. Further, they claimed damages in respect of the past six years' overcharges. The earlier proceedings were reported on pp. 105, 167.

The following were the Counsel engaged: For the Corporation Mr. BALFOUR BROWNE, K.C., Mr. J. A. FOOTE, K.C., Mr. A. H M'CARDIE, and Mr. J. B. WORTHINGTON (instructed by Messrs. Sharpe Pritchard, and Co., Agents for Mr. E. V. Hiley, Town Clerk of Bir mingham). For the Midland Railway Company: Sir ALFRED CRIPPS K.C., and Mr. L. MACASSEY (instructed by Messrs. Beale and Co.). For the London and North-Western Railway Company: Sir ALFRED CRIPPS, K.C., Mr. J. A. SIMON, K.C., M.P., and Mr. J. B. ASPINALL (instructed by Mr. C. de J. Andrewes). For the Great Western Railway Company: Sir ALFRED CRIPPS, K.C., Mr. J. A. SIMON, K.C., M.P., and Mr. HAROLD RUSSELL (instructed by Mr. R. R. Nelson).

Further Evidence for the Corporation.

Mr. *Walter Chaney*, re-called, and further examined by Mr. BALFOUR BROWNE, repeated that it was the limited length of the connecting siding at the Nechells works which forced the traffic to be delivered by the Midland Company in driblets. If, he said, the siding were extended, as it might easily be, or if the siding into the works were connected with any of the Duddeston Mill sidings, the Corporation could accept deliveries of full train-loads, and the Railway Company would be able to deliver the whole of their requirements in about half-an-hour to an hour's time. As to the two special sidings in the Duddeston Mill group which the Company said were reserved for the Corporation traffic (and which he had seen used for other traders' goods), it did not really matter to the Corporation whether they were reserved for them or not. Their traffic would do equally well on any other of the Duddeston sidings.

Sir ALFRED CRIPPS: I do not think it matters whether we reserve it in that sense or not. It is the occupation of space upon two sidings, whether it is reserved or not.

Justice LAWRENCE: Of course, there is an advantage in reserving it. It is no use saying there is not. If they were to put the traffic into a dozen sidings, there would be much more shunting in getting it out again.

Mr. BALFOUR BROWNE: That is their look-out.

Justice LAWRENCE: I do not think that is really a supportable business view of things.

Mr. BALFOUR BROWNE: It is the view I am going to try to put before the Court. If, for instance, they bring down a full train-load, and they find that their sidings are nearly all full, and separate the train-load into these ten sidings, that is their look-out, and not ours.

Justice LAWRENCE: I quite agree it is their look-out; but, as a matter of business, it is much better for you that they should only be put into two special sidings.

Mr. BALFOUR BROWNE: I quite agree; but it does not matter whether it is one siding or another. If I may say so, the mere question of reservation has nothing to do with it.

Justice LAWRENCE: No.

Mr. BALFOUR BROWNE: Then I get rid of that word in the Company's answer, which is apparently relied upon.

Sir ALFRED CRIPPS: If we are merely fighting about a term of that kind, I agree with my friend that it is not worth taking time over it.

Examination resumed: It was not correct for the Company to say the traffic was subsequently shunted day and night as required by the Corporation. The shunting was done entirely at the pleasure of the Company, who pleased themselves as to the hours at which they put the traffic in. As to empty waggons for coke, as a rule they gave the Company notice, perhaps once a day, of the number they might require during that day; and the Company put these on to the connecting siding at their own option. Then within a short time the Corporation locomotive came and took them into the works. He denied the correctness of the Company's allegation that the labour and expense in working the outward traffic was greatly increased by reason of the limited siding accommodation in the works compelling collection of coke in less than full train-loads. The accommodation was ample.

Mr. BALFOUR BROWNE: Now we will go to the London and North-Western Railway.

Sir ALFRED CRIPPS: There is no question between that Company and the Corporation with regard to inward traffic. It is only the outward traffic.

Mr. BALFOUR BROWNE: As to everything except coal, there is a question between us. They allow us a 3d. terminal on coal; but with regard to every other traffic there is a dispute.

Examination continued: Trucks were put upon a connecting siding, the same as in the case of the Midland Company, and a Corporation locomotive pulled them into the works. The Company did not intimate when they had placed traffic on this siding, so that they had to send out several times a day from the works and examine it. The outgoing traffic the Company removed from the works twice a day, at stated hours. At times there might be more than they could take out at once; and in this case the balance would be left for the next journey. As to coal, the Company delivered this almost when they liked. On Feb. 27, for instance, they delivered sixty trucks within an hour; while at other times they might only deliver a few. Even when they received the sixty trucks, they were able to deal with them at the works.

Charles A. Cannon, foreman shunter at the Saltley works, said that when the Midland Company took empties out of the works, they pulled them directly over to the Duddeston sidings. All the Company had to do was to hook on the engine and draw out the trucks. He expected the Company had to marshal the trucks somewhere; but they did not do it on the Corporation siding. The Corporation did not do it. It was just the same as if the Company picked up each truck from a separate trader. He had never known of any request being made to the Company to deliver any special coal, or coal in any particular order, to the works.

Justice LAWRENCE: We had some cards shown yesterday with requests for particular trucks to come. Have you ever known of that?

Witness: No; I never knew of it till yesterday.

And you are the foreman shunter?—Yes.

William Hirons, foreman shunter at the Nechells works, said the two sidings in the Duddeston Mill group, which were stated to be used only for Corporation traffic, were sometimes employed for other goods as well. The connecting siding for the works would hold fourteen large waggons or fifteen small ones. It was left to the discretion of the Company to get the traffic as they pleased from Duddeston Mill to the connecting siding. When the latter was empty, they filled it up at their own convenience. The Corporation were prepared to take the traffic out of this siding practically as soon as put in. Half-an-hour was about the average time it was allowed to stand there. The longest period he had known waggons to remain there was three hours. No instructions were given to the Company to bring in waggons in any special order. As to sending coke out, the Corporation put the trucks on the connecting siding, and the Company took them away to the Duddeston sidings; and he supposed they were marshalled in the same way as other traffic was marshalled there. To his knowledge, they had never refused or been unable to take any coal that the Company wanted to deliver to them. The Company signalled when empties and coke trucks could be taken out of the works on to the connecting siding.

Justice LAWRENCE: They have to go somewhere to be marshalled?

Witness: Yes.

It is fair to say, then, that the waggons leave Nechells in a rough state?—Yes.

John T. Hardwick, a waggon inspector of the Birmingham Corporation, said it was his duty to make arrangements for the waggons which were required to take the coal from the collieries to the gas-works. It was the practice of the colliery people, after they had weighed the coal upon their machines, to send it down into their sidings and label it; and then the Railway Company would pick it up, take it to a siding and marshal it for its destination, and then bring it forward. The bulk of the coal was sent in whole train-loads. That was to say, at the making-up siding the Railway Company made up a train-load for Nechells or Saltley, as the case might be, and then could run it right through if they wanted to. On arrival at Washwood Heath sidings, the trucks would be left for varying times, and would be taken on to the works when the Company liked—subject to the reservation that, if the Corporation had not got any coal, they sent and told the Company so. So far as he knew, coal had never been sent down from Washwood Heath siding either to Saltley or Nechells and refused by the Corporation. The coal-waggons were not always sent on from Washwood Heath sidings in the order in which they were received there. When he had seen waggons which had obviously been there longer than they would be in the ordinary course, he had requested the Company to send them on. This happened often years ago, but not recently. Except in these cases, he had never interfered with the order of delivery. He thought it was in July or August last year that the Company introduced the practice of sending advice notes of the number of waggons lying at Washwood Heath. He had not before that asked to be supplied with advice notes.

Mr. FOOTE: The present system of making returns is a revival of a system which began in January, 1906, for good or for evil. I do not think it is suggested by the Company that they ever sent any returns except in the shape in which they give them now—namely, the number of waggons lying at Washwood Heath. On April 26, 1906, Mr. G. Hampton Barber wrote: "Referring to my letter of Jan. 22 last respecting a daily return of the number of trucks of coal on hand at your Washwood Heath sidings in transit for us, please note that the information in the manner in which it is submitted is of no use to us; and you may please therefore discontinue making the returns." In July of last year they resumed sending these returns without request.

Sir ALFRED CRIPPS (in cross-examination): There is just one letter I ought to put to you. Apparently it is written by someone for you. It is signed "Mr. Riley, for Mr. Hardwick." It is dated Aug. 27, 1908, to Mr. Thompson, a Midland Railway official: "I have given instructions to one of the collieries to hold back all supplies of coal to Saltley for four days, and trust this will help to reduce the number of trucks on your hands, which I know stands at 416."

Witness: This was written by one of my clerks. I had no knowledge of it. I should question the number 416; he might thoughtlessly have added some other traffic to it. If I remember aright, I was away for my holidays at the time.

Mr. *William B. Lampard*, in answer to Mr. FOOTE, said he was a coal-factor, and owned over 600 waggons. He had sold coal to the Birmingham Corporation for the past seventeen years, in quantities up

to 130,000 tons per annum. The coal had come from various collieries —mostly in Derbyshire. He furnished the waggons for the supply of this coal; and during 1907 he had 5783 waggons loaded at the Derbyshire and Nottinghamshire collieries for the Corporation. On the average, the double journey took about 6·1 days—say, three days each way. This included the loading at the colliery, and the date of arrival at the colliery back again. He supplied coal from the same collieries to other people; and he should say that the time occupied in the Birmingham Corporation trade by the waggons was shorter than in the other cases.

Sir ALFRED CRIPPS: I do not know that this is relevant.

Mr. FOOTE: It is relevant in this sense. As I understand, the Railway Company suggest that we have this coal detained *en route* at Washwood Heath siding and Duddeston siding; and therefore I wanted to ask the witness whether the total time of transit of the waggons employed by the Corporation is shorter or longer than the transit to other traders in a like business.

Witness, in further examination, said that for this reason he made a difference in his charge for the hire of the waggons. He charged the Corporation 4d. per ton for carrying coal from Derbyshire to Saltley. He had frequently had to complain to the Midland Company of the detention of particular waggons.

Justice LAWRENCE: I should think half your life is taken up in making complaints as to detention?

Witness: Yes.

Is there any railway company that you have not complained to?—Very few. They are all the same.

Mr. FOOTE: At the time of these complaints, what is the daily average that you were delivering to the Birmingham Corporation?

Witness: Sometimes 40 waggons a day. From 35 to 40 a day on an average on a big contract. It varies every year.

Sir ALFRED CRIPPS: I ask no questions. I do not see that it is relevant in any way.

Mr. *Alfred E. Bond* said he was Managing-Director to Messrs. J. Abbott and Co., who supplied anything from 10,000 to 200,000 tons of coal a year to the Corporation. In thirty years, he could only recollect one occasion on which the Corporation asked him to stop, vary, or alter the even routine of supplying the coal. This was in 1904, when there was a temporary breakdown at the Saltley works. Their waggons accomplished nearly four journeys a month, which was considerably less than the average to other customers for the same distance.

Mr. *Thomas H. Hack*, Engineer-in-Charge of the Swan Village works, which he has superintended for the past seven years, said that of the incoming traffic about 87 per cent. was loaded coal trucks and empty coke waggons. At present all the coal came from Derbyshire and Nottinghamshire. It travelled over the Midland to the Great Western at Bordsley Junction, and came to the works, after being taken down to the Swan Village Basin. It was only during the past twelve months that the coal had come from the south; previous to that it was sent from the north. The reception sidings held 43 waggons; and other sidings would hold another 40 waggons. He had never found the slightest difficulty in taking coal as fast as the Great Western Company could bring it to him. Empty coke trucks were put on the siding in the order in which they were received from the works. The Company did the necessary marshalling outside. Swan Village Station was the station for the district.

Sir ALFRED CRIPPS: I do not think that Mr. Hack has said anything with which I disagree as regards the working, if I follow it at all.

Witness: I should like to say that on June 27 last year we had as many as 82 waggons at our works empty and full; and the maximum requirement of the works is not more than 39 per day.

Mr. BALFOUR BROWNE announced that, subject to interposing later the evidence of Mr. John Foster, the Engineer at Windsor Street, this was the Corporation case.

Sir Alfred Cripps's Address for the Railway Companies.

THE CHARGES FOR CARRIAGE OF COAL.

Sir ALFRED CRIPPS, in addressing the Court on behalf of the three Railway Companies, said he thought the principles they had to deal with there, both as to matters of principle and as decided in cases, had been fairly clearly ascertained. He did not contend that there was not room for discussion of certain points; but, still, in the main they were clearly ascertained. The largest, and by far the most important ground of complaint, as regarded value or extent of traffic, was the allegation made against the Midland and Great Western Companies that they were in some way or other charging either for station accommodation or station services, whereas they did not provide the accommodation or render the services. This was the main point in respect of the coal traffic. Then as regarded coke, or the outgoing traffic, which applied to all three Companies, he understood the same point had been raised —that they were purporting to make something in the nature of a terminal charge at the forwarding end, whereas they did not provide accommodation and did not give services. There were other small points—the Corngreave and Small Heath questions—but the ground involved was very slight, and presumably would be easily settled between the parties but for the larger consideration. Therefore he was going to deal first with the question as a matter of principle. What was the relationship between a trader and a railway company in connection with the rights of a trader under section 4 of the Railway and Canal Traffic Act of 1894? This was the section which gave a certain remedy to traders in connection with private sidings; and it was in connection with this section that the main dispute between the parties arose. It said: "Whenever merchandize is received or delivered by a railway company at any siding or branch railway not belonging to the company, and a dispute arises between the railway company and a consignor or consignee on such merchandize as to any allowance or abatement to be made from the rates charged to any such consignor or consignee, in respect that the railway company do not provide station accommodation or perform terminal services, the Railway and Canal Commissioners have jurisdiction to hear and determine such dispute, and determine what, if any, is a reasonable and just allowance or rebate." The Corporation case was to ask the Court to decide, first of all, as regarded coal traffic, what was a reasonable and just allowance or rebate, if any, which ought to be made to them. The charge the Companies were making to the Corporation was, of course, wholly justified and proper and legal as it stood. They were making a charge which worked out at about two-thirds of the conveyance rate alone. As a matter of fact, subject to any case which his friends might make there, the Companies were entitled to charge up to the maximum of the conveyance rate alone, on the assumption that they were only providing conveyance accommodation and conveyance services. This was the *primâ facie* position. The Railway Companies were making to the Corporation a perfectly legitimate charge on the basis that the whole charge was applicable to conveyance, and none of it had any relation whatever to these terminal services. He would agree that where there was competitive traffic of the same class to a private siding and a station next door to one another, and the railway company were making the same charge in each instance, there would be a case to answer. In other words, there would be an assumption that the Company were putting something into what they called their conveyance rate really in connection with what ought to be called a terminal charge.

Sir JAMES WOODHOUSE: Is not there an absolute presumption arising that by reason of using the station a terminal charge must be made?

Sir ALFRED CRIPPS replied that it was not necessary; but they might assume it for his purposes.

Sir JAMES WOODHOUSE: If you disintegrate the rate, must not you allot something to the terminal services? I suppose as to that you would rely on the Salt Union case.

Sir ALFRED CRIPPS: No, I think I may put upon that exactly what we have done here, because it is perfectly accurate. Continuing, he said they had been asked—he was speaking for the Midland Company now—in substance for a disintegration of their coal rate. They stated, and it was quite right, that there was nothing in the nature of a terminal charge or station accommodation in their coal rate—which was a conveyance charge, *plus* 1d. for services rendered at, or in connection with, a private siding. Though the whole charge would be within their conveyance maximum, they said that 1d. of the amount was a charge they were entitled to make under section 5 of one of the Provisional Orders Acts in connection with a private siding. Of course, this must be dissociated entirely from a terminal charge, which depended on different considerations and circumstances. There was no assumption against a railway company who were making a charge to a private trader within the maximum conveyance rate that they were including in that rate anything as regarded a charge for terminals which they were not entitled to make. Then there was no jurisdiction in the Court as at present constituted to decide exactly what was the proper charge for the Company to make for duties in connection with these private sidings, if the Corporation were raising the point that the Company were seeking to charge too much, because the Court would have to sit as arbitrator under one of the Provisional Orders which said that in case of dispute as to the charges which might be made by a railway company to a private siding owner under these conditions, the amount of the charges was to be settled by arbitration.

Justice LAWRENCE: Take it that 1d. is the amount of the disintegration attributable to the services. Do you say that the Court as at present constituted cannot deal with the quantum of the 1d.?

Sir ALFRED CRIPPS: That is so. But they can deal with it in order to see whether in substance the allegation of the Railway Company as regards the 1d. is probably correct or not, because we have given as the basis of our charge partly conveyance rate, and partly a charge which would come under section 5 of one of the Provisional Orders Acts. What this Court can do is to see whether that is what I may call roughly a *bonâ fide* suggestion made by the Railway Company.

Sir JAMES WOODHOUSE: Under the Order, the charge has to be reasonable.

Justice LAWRENCE: How do you distinguish between a terminal charge properly so-called and these things which come within this section 5?

Sir ALFRED CRIPPS: Under section 5, you can make certain charges to a trader for services in connection with his private siding.

Mr. BALFOUR BROWNE: At or in connection with.

Sir ALFRED CRIPPS said he would state exactly how the law stood, according to his view, on this point, as ascertained in this Court. Within the conveyance rate, the Company had to put the traffic on to the private sidings by just taking it down over the points, or they had to take the traffic, properly placed as regarded marshalling and matters of that kind, off the private siding by backing their engine down on to the trucks which had been put in order in the private siding of the trader. Everything outside of a simple operation which was rendered necessary by the reasonable manipulation of the traffic was a service in respect of which the Railway Company were entitled to make a charge under section 5. It was on an entirely different basis from the terminal charge, which was a maximum charge for which the Company gave station accommodation. Supposing, for instance, the private siding owner had not sufficient accommodation for taking his traffic right off the main line, but, as they said here, the Railway Company were obliged themselves to supply siding accommodation, such as they did at Duddeston Mill and Washwood Heath, then they were entitled, in respect of the cost so thrown upon them, to make a charge, because the sidings were in connection with delivery, not conveyance. The other elements of charge permissible in connection with a private siding were the incidental costs of shunting, the provision of railway engines, and matters of that sort, where the private siding owner had not sufficient accommodation. For instance, take the case here, of where it was necessary to do shunting operations on the Railway Company's sidings because there was not sufficient room within the area of the private sidings. This was a matter the Court had to take into consideration. In fact, everything which was thrown as a cost upon the Railway Company outside what he might call the simple duty of putting the full waggons in and taking the empties or return waggons out, had to be brought into account.

Mr. BALFOUR BROWNE: I think conveyance means delivery too. There is no conveyance unless you deliver.

Sir ALFRED CRIPPS said that, of course, there was no conveyance unless they delivered; but there were services in connection with conveyance, and services in connection with delivery. Where the services in connection with delivery were not in connection with conveyance, and those services were thrown upon a railway company in connection with a private siding owner's accommodation, he had to pay. He agreed that the amount must be reasonable; but the considerations the Court had to bear in mind in ascertaining what was a reasonable amount were, in his view, well known, well ascertained, and well recognized at the present moment. Taking the Washwood Heath sidings, they were in truth and in substance an enlargement of the station terminal accommodation at Lawley Street. That was the real meaning of them.

Justice LAWRENCE: The mode, as I followed Mr. Balfour Browne, in which he treated that was this: He said when you dealt with the traffic in sidings at Lawley Street, no doubt the Court held in the 1896 case that you were entitled to some remuneration in respect of the services you so rendered; but now you have put these sidings down *en route* for our works, you have to come either through them, or by them, or past them to come to me at all. So far as I understand it, he says unless you can show that I request you to do something to my traffic in the sidings, then it is transit, and not delivery.

Sir JAMES WOODHOUSE: Regarding them purely as running lines.

Sir ALFRED CRIPPS: I agree that, if they were in the nature of running lines, my friend would be right. I will answer what your Lordship put to me. Whether or not it is at the request of the Corporation, to my mind makes no difference. Supposing you are carrying traffic for a private siding owner, and in order to deal with it reasonably, so as not to block your main line, and in order to deal with it as regards your traffic facilities, you are obliged to deal with it in a particular way having regard to the accommodation which the private siding owner has got, whatever it may be, you are entitled to charge in respect of that. It is not on his request. It is whether, having regard to the conditions under which his private sidings are worked and your line is placed, the particular way of dealing with the traffic is reasonably necessary or not. That is the test.

Justice LAWRENCE: Is that clear? If you look at the latter part of section 5, it would seem that he could negative the request by giving you notice to that effect.

Sir ALFRED CRIPPS: The request in this case—I never heard of it being put as a specific request—arises in this way. We are asked to carry his traffic to his private sidings; and we come under a contract to do it. That is the nature of the request to us. We are the carriers; he is the employer. If in carrying the traffic under these conditions to his sidings, it is reasonably necessary for the proper manipulation of the traffic to incur expenses either as regards accommodation or services, they would come within section 5. It would be impossible to deal with it in any other way. If the necessities of the traffic under the contract to carry which he is asked to undertake reasonably necessitate costs of this kind, that it is a request in the sense that it is necessary.

Justice LAWRENCE: You say the request may be expressed or implied, and you may imply it from the circumstances under which alone the traffic can be dealt with. That is very intelligible, and, broadly speaking, very good sense; but how do you read this proviso in section 5?

Mr. BALFOUR BROWNE: How could I tell them not to use Washwood? It would be regulating their traffic.

Sir ALFRED CRIPPS: At the beginning of section 5 there are these words: "The Company may charge for the services hereunder mentioned, or any of them, when rendered to a trader at his request or for his convenience."

Mr. BALFOUR BROWNE: It is the proviso.

Sir ALFRED CRIPPS: But one must read the proviso in connection with this. The proviso is: "Provided that where before any service is rendered to a trader he has given notice in writing to the Company that he does not require it, the service shall not be deemed to have been rendered at the trader's request or for his convenience."

Justice LAWRENCE: That proviso negatives both horns of the original proposition.

Sir ALFRED CRIPPS: I do not know. I am not aware here of any formal request of the kind having been before us.

Justice LAWRENCE: I do not think there is.

Sir ALFRED CRIPPS: The only difference would be, if they did request us, we could not deliver. According to my evidence, we could not do it. We are bound, owing to the necessities of our traffic arrangements, to act as we do. I never heard in these cases questions of what I may call the actual request raised. The request comes when they ask the Railway Company to undertake the contract of conveyance and delivery. The contract of conveyance and delivery they are bound to carry out in connection with the necessities of their line and the convenience which the trader gives, and all incidental matters of that kind. When you are doing that, you are doing the best that you can. It would be utterly impossible to suggest that a railway company would create inconveniences, or anything of that kind. That is absurd; but assuming we are *bonâ fide* doing the best we can for a customer, if we find it is necessary to incur expenses beyond the mere putting the train on a siding or taking away the trucks put ready for our engine, then it is common ground—subject to what my friend said as between conveyance and delivery—that anything beyond this does not come within the conveyance rate, and we may make a reasonable charge for it.

Justice LAWRENCE: There is another aspect of the matter which is further pressed upon one's mind by the treatment which the witnesses for the Corporation have given it. They seem to say that all these things ought to be regarded as things done by the Company for their own convenience. As I gather, your argument is that the trader who asks a railway company to bring traffic to his works asks them to do all things which are reasonably necessary for bringing the traffic into his works; and consequently if it is reasonably necessary in order to bring traffic into his works that the things should be done which you are speaking of, then they are done by his request, and you can recover payment for them under this section. But they seem to say, "No, you cannot, because they are done for your convenience; and you must alter your line and make it larger, or make it this or make it that." Has there been any case which has ever suggested that you have a duty to make your particular junction with their works of a different character from that which it actually is?

Sir ALFRED CRIPPS: I am not aware of any. I do not want to make an admission as regards the Railway Companies I am representing; but nothing of the kind arises here. I can conceive a case where some little matters might be done by a railway company, even if there was not a legal obligation; and it might be said by not doing it you are keeping up a source of expense to the trader that is not necessary. I think, under these circumstances, if a railway company were well advised, they would correct a matter of that sort.

Justice LAWRENCE: If I understand you aright, you say in such a case as that, it would be a reasonable facility which they ought to provide.

Sir ALFRED CRIPPS: Yes. That is how it would work out, if dealing with it technically. Continuing his argument, he said that the Companies had to give evidence on this part of their case. If the Court came to the conclusion that what they were doing was not a matter which was reasonably necessary for the conduct of the traffic, but was merely a kind of luxury for their own convenience, or something of that kind, then his friend would prove his case against him on this point. But as long as it was reasonably incident to the contract of carriage and delivery that they had undertaken, having regard to all the conditions, then undoubtedly, on every principle of the Court, the amount as regarded cost of service would have to be ascertained at a reasonable figure against the trader. Since the last case, the Midland Company had put down, for the facility of all their traffic as well as this particular traffic, at very considerable cost, the Washwood Heath sidings, to enlarge what would be their station accommodation at Lawley Street—station accommodation in the same sense as in old days, when they had to take the Corporation traffic as far as Lawley Street. His friend's position would be that the effect of all this would be to diminish the amount of charge which the Company would be entitled to make either at the station or at the private sidings, because he would say that the expenses formerly incurred at the station, or the difficulties at the private siding, had been altered in some way by transferring these difficulties from delivery to conveyance. This could not be so. The new arrangements were made in order that the Company might deal better at Birmingham with the delivery of incoming traffic and the collection of outgoing. His first point was that there was nothing to show that this section of the 1894 Act ought to be put in operation against them at all; and his second point was that they could justify as *bonâ fide*, fair, and accurate the differentiation they had made as regarded their charge—allocating it partly to the conveyance charge, and partly to service rendered (under section 5) to the trader. As to the Pidcock rule, even as regarded the measure of rebate, this had on several occasions been referred to by the Court as inapplicable; but supposing that the Court came to the conclusion that the account the Railway Companies gave as regarded the rate was inaccurate and untrue, and it came to be a question of the amount of damages, then it might arise. With regard to Lawley Street, his friend had shown, at the outside, that there was the same rate of charge there as at Saltley. If there was competitive traffic at these two points, there might be some suggestion of undue preference; but where there was not, and where the Railway Company were charging absolutely within their legal rights, it was not for the Court to interfere for the mere purpose of diminishing a legal charge within the maximum powers which the Railway Company had made for a long series of years. The letters written by the Company could not be taken in any sense as being an admission against them on the lines that his friend had sought to use them.

Justice LAWRENCE: The way I understand him to be putting it is this: He says, "I do not want to go into questions of presumption, because there are the letters which I take as facts. Therefore you have made a charge of so much for conveyance and so much for services which we will say are services under section 5." But he says you do not perform any services under section 5. This is the point at which he joins issue with you upon that subject. He may be right, or he may be wrong. Supposing he was right in saying you do not perform any services under section 5, would not he then be entitled to say, "Very well, I have proved my case; and I am entitled to my rebate"?

Sir ALFRED CRIPPS: I think the result of that would be, he would show that either the penny or some less sum, when you ascertained the amount, according to his point of view could not be charged against him. That is not a rebate.

Justice LAWRENCE: I am assuming you are right in what you said upon the subject—namely, that if there is anything due to him, the Court as at present constituted is not competent to go into the question of quantum; but is he not entitled to say: "You do not perform any service which comes within section 5; and your letter is an admission that you are making a charge which could only be justified if you did perform some such service"?

Sir ALFRED CRIPPS: I agree to that extent.

Sir JAMES WOODHOUSE: Do you say that we could not determine the reasonableness of the charge under section 5?

Sir ALFRED CRIPPS: You could, of course, if you had been appointed Arbitrators.

Sir JAMES WOODHOUSE: Was not the point decided in the Scotch case of Cowan?

Mr. BALFOUR BROWNE: Absolutely. It was decided also in the Birmingham case.

Sir ALFRED CRIPPS: You can go into it for the purpose of showing what I call roughly the *bona fides* of the Railway Company, but not quantitatively. My friend says our explanation of the charge is not a true one; and the Court will have to decide whether it is or not. Of course, upon that issue they have to take into consideration whether what we are putting forward is a reasonable proposition. But suppose it was a question whether the charge for services was 1d. or ½d., that is not what the Court have to consider. My friend is claiming a rebate not as regards the 1d. in connection with these services, but a rebate actually upon what he says are the terminal charges that we are making in connection with Lawley Street goods.

Sir JAMES WOODHOUSE: But assume we came to the conclusion that

3d. was not a reasonable rebate to make, and that some services were performed *ex termini* the conveyance, do you argue that we could not say you shall be entitled to 1d. or something more in consideration of those services?

Sir ALFRED CRIPPS: I do not go so far as that.

Sir JAMES WOODHOUSE: Do you say it is a question of whether 3d. is allowed or nothing?

Sir ALFRED CRIPPS: No; I do not say that. Mr. Balfour Browne is stating that he wants a rebate or allowance, because, the Corporation being private siding owners, we are not performing certain services. What the Courts have done is to consider whether the attitude of a railway company is reasonable or *bonâ fide*, not for the exact ascertainment of what they are entitled to charge under section 5, but as a test to see whether in the charge they are making to the trader there may not be an element of really terminal charge which they are not entitled to make; and to that extent, of course, they have given an allowance or rebate. I admit it is a fine differentiation in a certain way.

Mr. BALFOUR BROWNE: It does puzzle me.

Justice LAWRENCE: I think I follow. What you mean to say is this—that, if we come to the conclusion that the Midland Railway Company are, in point of fact, making this charge of 1d., not merely for services which come within section 5, but for a terminal service, strictly so-called, then it would be within the jurisdiction of the Court, as at present constituted, to determine how much of the 1d. should come off as rebate of the station terminal.

Sir ALFRED CRIPPS: That would be the way it would work out. Proceeding, he drew attention to decided cases bearing upon his contention. The first was the *New Union Mills Company v. Great Western Railway Company* ("Law Reports," 1896, 2 Q.B., p. 290); and the second, the *Corporation of Birmingham and Others v. Midland Railway Company*. The latter, he said, was very close to the present case. It was the question of a rebate or allowance in connection with the Saltley sidings. Since then there had been some change in the conditions; but these were all in favour of the Railway Company. Justice Collins then, in stating that the application must fail, said the applicants had to satisfy the tribunal that they had been called upon to pay a charge which they ought not to pay, by reason of the fact that they had not received the accommodation, or had the benefit of the services, in respect of which that charge was made. The learned Judge then continued: "How do they discharge that onus which is put upon them? They say: 'There are two different places at which we (the Birmingham Corporation) receive our coal—one at the Lawley Street Station of the defendants, and the other at the Saltley siding. The charge made to us is the same at both places—namely, 3s. a ton. At Lawley Street there is a station belonging to the Railway Company; and the Railway Company have admitted that some portion of the reduced rate of 3s. is applicable to a terminal charge at that station. Inasmuch as the rate charged to Saltley siding is the same as the rate charged to Lawley Street Station, we assume that there is in the 3s. charged to Saltley siding a terminal charge, just as there is in the 3s. charged to Lawley Street Station.' It seems to me, unless they make good that position, they have not established their *primâ facie* right to a rebate on proof that Saltley is not a terminal station. I agree that no terminal charge can be made in respect of anything done at the Saltley siding. It is not a station; and if there is any station charge in the rate to Saltley, that station charge will have to come off, subject, it may be, to a set-off in respect of other services which the Railway Company might be entitled to charge for under section 5 of the Provisional Order. Now, speaking for myself in this case—I am not quite sure that on this particular point my colleagues agree with me—I am not satisfied that the applicants have here discharged the onus thrown upon them of satisfying me that there is any charge whatever for station accommodation made in respect of the traffic delivered at the Saltley sidings." Coal was delivered at the time at Lawley Street Station for Adderley Street gas-works. Then, the traffic now put into Washwood Heath sidings was put into Lawley Street Station, shunted, &c., and then taken on to the Saltley sidings.

Mr. BALFOUR BROWNE: It was taken into Lawley Street, and taken back; and the next sentence in the judgment shows it.

Sir ALFRED CRIPPS then read further portions of the judgment, one sentence of which was: "It seems to me that when one looks broadly at the whole of the circumstances of this case, the amount of work done by the Railway Company for the applicants at the Saltley siding is larger, is more expensive to them, and is more advantageous to the applicants than the work done at Lawley Street Station; and under these circumstances, it seems to me that there is no case made for a rebate." Sir Frederick Peel, in his judgment, said: "I think that, on the one hand, the Saltley rate must be lower than the rate to Lawley Street by the amount of the terminal, whatever it is, which is included in the Lawley Street rate. On the other hand, the Railway Company, I think, have shown reasons why the Saltley rate should, in certain respects, be higher than the Lawley Street rate, first of all by the extra distance over which they have to haul in the case of Saltley; and, secondly, in respect of the storage accommodation which they provide for the convenience of the Corporation. Setting one against the other, I come to the same conclusion as the learned Judge." He then went on to quote extensively from the case of *Salt Union v. North Staffordshire Railway Company* (Vol. X "Railway and Canal Traffic Cases," p. 179).

Fifth Day.—Friday, March 26.

Sir Alfred Cripps's Speech Resumed.

Sir ALFRED CRIPPS, on resuming his speech for the Companies, argued that the Court must be satisfied, either by proof direct or by inference, that a terminal charge was included. He then referred at length to several other decided cases. He said that what emerged was this—and he suggested it was good and sound sense—that when they were fixing an allowance or rebate off a rate which was in itself legal and within the maximum, there was really no basis upon which they could set to work to try to do it, without they first of all came to the conclusion, on all the circumstances brought to the notice of the Court, that something for terminal had been included. Of course, if they arrived at the opinion that something was included, it had to be excluded. What he did say most strongly, as a matter of principle, was that it was contrary to all the provisions of Railway Acts and Railway legislation that, where they were charging a rate in itself legal—that was, a rate within the maximum, having regard to the charges which were included under that maximum—the Court could say the charge was an unreasonable one for them to make. Of course, the Court could enter upon an inquiry in such a case, for instance, as when undue preference was suggested, or something of that kind.

Justice LAWRENCE: If you go to a Court of Law and prove merely that a charge is made and that it is within the maximum, and say that you do not think it is reasonable, and there leave your case, of course, no Court can hold that the applicant has made any case. But suppose he goes and proves circumstances from which the unreasonableness of the rate may be inferred, what is to prevent the Court from going into it.

Sir ALFRED CRIPPS: He cannot do it; and there is no case where a Court of Law has gone into it.

Justice LAWRENCE: Surely.

Sir ALFRED CRIPPS: I am perfectly certain that there is no case in the books where such an issue has been allowed to be raised. Of course, the pure point of an overcharge is, Are you exceeding your maximum or not? Subject to the principle of undue preference, and matters of that kind, taking the common-law basis, within the maximum every rate made is *per se* assumed to be reasonable.

Mr. BALFOUR BROWNE: If you alter the rate to-day by increasing it a farthing, it is no longer reasonable unless you show it to be reasonable.

Sir ALFRED CRIPPS: I agree with that.

Sir JAMES WOODHOUSE: That makes the existing rate for the time being the maximum rate.

The Coke Rate.

Sir ALFRED CRIPPS, resuming his argument, proceeded to deal with the question of the coke rate, which, he said, was the only other point besides coal which was of any substance at all. From one point of view, he was not so strong on the coke rate as on the coal rate; but yet he was well within the principles he had laid down. When the case was started, it was found that, attributing 1d. for services in connection with private owners' sidings, this 1d., *plus* the conveyance rate, was less than the rate they were actually making. They put in a terminal at the other end. Of course, there was no question about that. But putting in their maximum, and adding the 1d. for services, they could not justify the rate they were making. This he thought applied to all three Companies. When the matter was brought to their notice, they put in a revised scale, admitting that in certain circumstances they had charged too much, and reducing all the rates to such a level that they could be justified on the 1d. principle. So far as the Companies had recognized this position, they were liable on the six years' basis.

The Case for the Companies Summarized.

Summarizing under one or two propositions what appeared to him to be the position in a case under section 4 of the Act of 1894, he said he thought it was pretty clear that where a railway company were within the maximum charge for conveyance, and there was no other consideration—no comparable station rate, or anything of the kind—the principle adopted in the Salt Union case must apply. That was to say, they had a railway company charging an ordinary legal rate within the maximum for the conveyance services or terminal services which they were in fact providing, and there was no reason whatever for interfering with them. His second proposition was that there was a large balance of authority as the matter stood that the Court could not make an allowance or rebate without the terminal charge in some form was included in the charge complained of. He had gone through the authorities on this point, and shown there was some difference of opinion; but he could not, when he came to think it out, formulate in his own mind how they could really quantify a rebate or allowance, if no charge was made at all in respect of the subject-matter. This position was emphasized here, because they were asked to disintegrate—the Midland Company were, at any rate. They did disintegrate, and showed, if the disintegration was to be believed, that the charge did not in fact include anything for terminal. In letters, they showed how the rate was, in their opinion, made up—exclusive of this element altogether. As to the third proposition, when they considered this case on principle, it really seemed to him that, though the Corporation were not questioning directly, as they would under section 5, the value or cost of the services which the Companies were rendering in connection with the private sidings, yet they were really saying that the 1d. was too much. This seemed to him to be the substance of their case. Of course, on this point, apart from questions of presumption or rebuttal, the Court would have the direct evidence of the Railway Companies showing what services outside the ordinary conveyance service they had to perform, and how they thought that the 1d. was more than covered in respect of these services. He was going to say, further (particularly as regarded the Midland case), that the facts now were really much stronger than they were at the date of the old case. In other words, a bigger cost had been incurred now by the Railway Company for the benefit of the delivery at the Corporation sidings than was the case in 1896, because of the large additional sidings that had been laid down.

The hearing of evidence was then resumed.

(To be continued.)

Public Lighting of Penge.—The lighting of the streets of Penge and Anerley has of late been a much-discussed topic, and several public meetings have been held to formulate a scheme to provide better illumination of the chief business thoroughfares. On the 19th inst. another meeting was held to receive a report of the Committee appointed to deal with the question. They stated that they had considered different kinds of lighting, and had come to the conclusion that gas-lamps with inverted burners would be the best for the district. The report was adopted; and it was unanimously agreed that it should be sent to the Penge Urban District Council with a deputation of tradesmen. The Committee expressed regret that they could not give any idea of the capital outlay involved, as the Council were then in communication with the South Suburban Gas Company on the subject.

EXAMINATIONS IN GAS ENGINEERING.

The City and Guilds Question Paper.

Our readers are aware that the examinations in "Gas Manufacture," which have been for so many years conducted by the City and Guilds of London Institute, are now held on two branches of the subject—"Gas Engineering" and "Gas Supply." The Examiner for the former is Mr. W. Doig Gibb, of Newcastle; and for the latter, Mr. J. H. Brearley, of Longwood. The examinations in "Engineering" were held last Saturday; and those in "Supply" are fixed for the 1st prox. The following were the questions set by Mr. Gibb; the candidates being directed to confine themselves to one grade only, and not to attempt to answer more than eight of the numbered questions and only one of the alternative questions in the four hours allowed.

Ordinary Grade.

1. (*a*) By the aid of a sketch or sketches explain the construction of a regenerative furnace, and discuss briefly the advantages of this (if any) over an open-fired furnace. [40 *marks*.]

or, (*b*) Describe briefly any coke-handling plant from retorts to coke-yard with which you are acquainted, and compare, in general terms, the advantages and disadvantages of various mechanical systems and hand work. [38.]

2. Sketch a cross section of a hydraulic main with a dip-pipe in position, and show an arrangement by which the seal on the dip-pipe can be regulated and the dip-pipe seal be maintained in water without the tar rising too high in the hydraulic main. [36.]

3. (*a*) Theoretically, the primary and secondary air supply to a generator furnace should be in equal volume. Why, in practical working, has the primary-air damper to be more open than the secondary-air one? [26.]

or, (*b*) What are the general effects of low and high temperatures in the retorts on the quality and the quantity of the gas produced from the retorted coal? [30.]

4. Describe the practical working of a carburetted water-gas plant, and name the special points which require watching if a uniform gas is to be the result. [36.]

5. (*a*) After the greater part of the water has separated itself from the tar in a tank by natural settlement, the tar when pumped for distilling purposes still contains water. Describe the process by which the percentage of this water left in the tar can be accurately determined. [36.]

or, (*b*) How would you test the value as a purifying material of a sample of oxide of iron? Give the approximate results which you would expect to obtain from an average sample of any particular oxide with which you are acquainted. [36.]

6. (*a*) Describe, with sketches, any form of atmospheric condenser with which you are familiar, and state the advantages claimed for an arrangement by which the path of the gas through the condenser can be reversed at will. [38.]

or, (*b*) Discuss the relative advantages of tower scrubbers and mechanical washers. Explain, with sketches, the most efficient methods of distributing the water in a tower scrubber. [36.]

7. (*a*) What are the principal constituents in saturated gas lime? Does prolonged exposure to the air before being used for agricultural purposes, improve or deteriorate the gas lime from a farmer's point of view? If any changes take place, state briefly and generally what those are. [36.]

or, (*b*) Give the chemical reactions which occur in lime and oxide when unpurified coal gas is passed through them. [36.]

8. (*a*) How would you remove the SH_2 present in the gas after condensation? Give the chemical reactions. [40.]

or, (*b*) Explain briefly how the amount of nitrogen present in purified gas is usually estimated. [36.]

9. (*a*) If a spiral-guided (Gadd and Mason) telescopic holder be constructed in a concrete tank, why is it not necessary to provide radial movement on the guide-rollers attached to the holder itself, and equally necessary to provide this on the guide-rollers fixed to the tank? [32.]

or, (*b*) A holder does not give the required pressure, and it has been decided that machinery must be employed to take the gas from the holder and deliver it to the governor-house. The required work can be done by either enclosed "open" fans or by ordinary exhausters. Irrespective of first cost or cost of running, which would you employ? Give reasons for your preference. [38.]

10. What is meant by correcting the amount of a volume of gas to standard temperature and pressure? A volume of gas measures 500 cubic feet when measured at 65° Fahr., with the barometer at 29·5 in. What volume would this be when corrected to standard temperature and pressure? [36.]

11. Describe the different joints and jointing materials with which you are acquainted which might be employed in connecting together the straight lengths of a cast-iron gas-main laid in a road or street. Under what circumstances might it be desirable to lay a wrought-iron main in preference to a cast-iron one; and if this were done, when would it be most desirable to specially protect the wrought-iron of which the main would be composed? [36.]

Honours Grade.

1. (*a*) Name the chief points of difference in, and the special advantages claimed for:—

(i.) Woodall-Duckham vertical-retort system,
(ii.) Dessau vertical-retort system,
(iii.) Munich chamber system,
(iv.) Love's 45° inclined system. [40 *marks*.]

or, (*b*) Assuming that a single section of coal-gas plant be required to turn out one million cubic feet per 24 hours, what would be the approximate figures: (*a*) Length and breadth in feet of retort-house (inside sizes, ignoring coal-store, and for hand stoking), (*b*) number and size of horizontal retorts, (*c*) square feet of condensing surface (atmospheric), (*d*) cubic feet in tower scrubbers (no washers of any kind to be used), (*e*) square feet of single sieve area in purifiers each containing four tiers of sieves (oxide to be used), (*f*) sizes of gas-main connections throughout the works? State the approximate costs for: (*g*) Retort-house and retorts complete (without coal-store or machinery, but with horizontal retorts for hand charging, regenerator furnaces, and stage floor), (*h*) atmospheric condensers and foundations, (*k*) exhausters and boilers (without houses, chimneys, or stand-by plant), (*l*) scrubbers, pumps, and foundations (no washers to be employed), (*m*) purifiers and connections on ground level with house to cover purifiers, and in addition as much extra space for materials as purifiers themselves will occupy. [40.]

2. (*a*) If a bed of retorts heated by gas from a regenerative furnace is first heated well and evenly, and afterwards unevenly, what steps would you take to ascertain the causes for this bad working? [36.]

or, (*b*) What are the effects of temperature (i.) on the volume and the quantity of the produced tar, (ii.) on the production of ammonia, (iii.) on the impurities in coal gas which have to be removed (CO_2, SH_2, CS_2)? [32.]

3. (*a*) How do variations in (i.) quantity of air blown in, (ii.) quantity of steam blown in, (iii.) temperature of carburettor and superheater, affect the quantity and quality of carburetted water gas? How would you proceed to test the oil used in carburettor by fractional distillation? [34.]

or, (*b*) Compare concisely the claimed advantages and disadvantages of high and low grade gases. [30.]

4. (*a*) What proposals have been made, and what processes have been tried, to revivify spent lime to enable it to be again used for coal gas purification? [38.]

or, (*b*) Describe any method for determining the amount of cyanogen present in purified coal gas and in spent ammoniacal liquor. Why is it necessary in the latter case to reduce this quantity as much as possible when the spent liquor has to be run into a sewer or river? [32.]

5. (*a*) How can the amount of NH_3 in a sample of sulphate of ammonia be accurately determined? If a sample contains 24·75 per cent. of ammonia, what percentage of nitrogen does it contain? [36.]

or, (*b*) If a "closed" saturator be used in the manufacture of sulphate of ammonia, how can the arsenic which may be contained in the acid be removed so that a good grey salt can be produced? [34.]

6. (*a*) Describe fully the process employed for determining the amount of naphthalene in coal gas. [36.]

or, (*b*) Describe fully the method you would adopt for determining the amount of CO present in a town's supply (containing from 10 to 20 per cent. of carburetted water gas). [34.]

7. (*a*) What is meant by ammoniacal liquor being 10-oz. strength? What percentage weight of NH_3 does such a liquor contain, and what does this amount to in grains per gallon? State a method of accurately determining the amount of contained NH_3. Why does the ordinary hydrometer test only give very approximate results? [32.]

or, (*b*) Explain, with sketches, a standard calorimeter, and describe the process of making a test of gas with this. Explain clearly the difference between "gross" and "net" calorific values. [36.]

8. (*a*) Give a brief description of the different systems employed for transporting coal in a gas-works. [38.]

or, (*b*) Explain why different gases when burned at the same rate through the same burner give different lengths of flame. [30.]

9. (*a*) A concrete tank is required for a large gasholder. What ingredients, and in what quantities, would you make the concrete with? What precautions would you take to insure firm bonding between the horizontal joints and between the vertical joints of the different batches of concrete employed? What special precautions would you take if it were to be specified that the concrete was to be thrown from a height, and what are your objections to this practice? What specification would you give for the cement to be employed, and how would you test the cement when delivered? [40.]

or, (*b*) A gasholder has just been finished, and the air in it has to be displaced with gas. It is not desirable to "blow off" in any careless way. Show, by a sketch, what method you would adopt to insure safety and to get such samples of the "blown off" gas as might be required for testing purposes. [34.]

10. (*a*) Describe, with sketches, an efficient apparatus for keeping the lutes and tank of a three-lift gasholder free from ice, steam being available for this purpose. [36.]

or, (*b*) A single-lift gasholder, 137 feet diameter, is open to the air when the tank is quite filled up with water, the tank being 140 feet diameter, and the depth of water in tank from bottom till it just overflows, 42 feet. A pressure of 5 inches is required to lift the holder. When the holder is shut off from the air and gas forced in, how many gallons of water will have passed through the overflows by the time the holder is just commencing to rise? [32.]

Double Gas Fatality at Liverpool.—Last Wednesday morning, two men were found suffocated and two others unconscious in a boarding-house in Hardy Street, Liverpool, used by emigrants waiting for the Cunard steamers. The four men arrived a day or two previously from Finland, bound for America. They occupied the same room in the boarding-house; and on Tuesday night, when the attendant went his rounds, he found them playing cards. It is supposed that they blew out the gas when going to bed. Upon the room being entered, it was full of gas; and when a doctor arrived he pronounced two of the men dead, while the remaining two were unconscious.

Engineman Killed at Salford Gas-Works.—While following his occupation as an engine-tenter at the Salford Corporation Gas-Works, in Regent Road, on Tuesday last, Thomas Ackerley, aged 57 years, met his death. Ackerley had charge of two engines used for the purpose of working hydraulic lifts and capstans. He was asked to stop the engines, in order that one of the capstans could be repaired, and a few minutes later was discovered dead, wedged between the crank shafting and the engine-bed. At the inquest, when a verdict of "Accidental death" was returned, it was suggested by witnesses that Ackerley had not properly shut-off steam, and that while examining the machinery the engine started; he being caught in the shafting and killed.

LIGHTING OF THE CITY OF LONDON.

The Recent Deputation of the Streets Committee to the Continent.

On Monday last week, the Lord Mayor (the Right Hon. Sir George Wyatt Truscott) and Sheriffs were the guests of Mr. C. A. Teuten, the Chairman of the Streets Committee of the Corporation, at a dinner held at De Keyser's Hotel, for which a large number of invitations had been issued.

The toast of "The Lord Mayor and Corporation" was proposed by Colonel Leese, who remarked that so-called "reformers" had tilted against the Corporation; but he believed this body would long remain an example to all others of a like character. After alluding to the remarkable and interesting history of the Corporation, his Lordship proceeded to say that the Streets Committee gave an example of successful work well done for the benefit of the citizens of London. He was correct, he believed, in stating that there was no better-lighted, better-paved, or better-cleansed city in the world than their own capital. These results were due largely to the Committee and their excellent officers.

A presentation of a silver bowl and a timepiece having been made to the former Chairman of the Streets Committee (Mr. G. H. Heilbuth), the Lord Mayor proposed "The Chairman;" saying Mr. Teuten had a record of service second hardly to that of any one of the Corporation. In eight years he had filled no fewer than three chairs. Entering the Court in 1901, in 1905 he was elected the Chairman of the Officers and Clerks Committee, and in 1907 the Chairman over the Central Markets Committee, while he now directed the work of the Streets Committee.

In acknowledging the toast, the Chairman spoke of the recent visit which he and five other members of the Corporation had made to various Continental cities The journeyings, he said, covered fourteen days—"fourteen days' hard labour." From the experience which had been gained, they believed they would be able to save money to the ratepayers. For years his predecessors in office had endeavoured to get the best possible light for the City; but the difficulty was that one street was lighted by electricity, another by gas, and a third by inverted incandescent gas-burners under pressure. Looking through the City, Fleet Street, he thought, was the best-lighted thoroughfare. In all, there were in the City 3160 public lamps, of which 500 were electric, and 110 inverted incandescent gas-burners under pressure. With regard to the tour, the principal cities visited were Brussels, Cologne (which was brilliantly illuminated, the main thoroughfare being lighted by arc lamps of 1200-candle power, centrally suspended), Düsseldorf, and Berlin. The authorities in Berlin had decided on spending 7 million marks, at the rate of a million per annum, on installing in all thoroughfares inverted incandescent gas-burners under pressure. This decision was arrived at after much investigation and many experiments by their Professor of Chemistry (Professor Drehschmidt). Other cities visited were Dresden, Vienna, Munich, and Paris—where there certainly was quantity, if not quality. He added that if one system could be decided upon for the lighting of the City of London, much money would be saved to the ratepayers.

RIVER PLATE GAS COMPANY, LIMITED.

The Municipality and the Price of Gas—A Forced Reduction—Scheme of Amalgamation of the Three Buenos Ayres Gas Companies.

The Annual Meeting of the Company was held last Friday, at the River Plate House, Finsbury Circus, E.C.—Mr. A. E. Bowen in the chair.

The Secretary (Mr. H. T. Adkins) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The Chairman, in commencing the proceedings, referred to the death of Mr. Alfred le Rossignal. He said the members of the Board all felt his loss very much. He had been a Director of the Company since its inception in 1897; and his vast business capacity, and intimate knowledge of the Argentine, were of the greatest value to the concern. Proceeding to move the adoption of the report and accounts, he said he was very pleased to again meet the shareholders with what they might consider to be a very satisfactory statement of affairs, especially when consideration was given to all the trouble they had had, and the adverse circumstances under which they had laboured almost throughout the year. The profit was a little better than in the previous year. It was £130,445, against £129,325—say, £1100 better. But it would be noticed that £24,627 had been spent on upkeep, against £20,718 in 1907. The increase in the gas sold last year was no less than 10·33 per cent. over 1907; and this was on top of an increase of 7·27 per cent. over 1906, and 8·70 per cent. the year before. Of this increase of 10·33 per cent., 44 per cent. was for lighting purposes, and 56 per cent. for cooking and heating, which, as the shareholders would see, was now a very important branch of the business. They had upwards of 6400 cookers and grillers hired to customers on Dec. 31 last. Coal cost 2s. 3½d. per ton less than in 1907; and it was hoped the cost would be even lower this year. The number of public lamps now lighted and attended to was 8970, or an increase of 852 during the year. It would therefore be seen that expansion in every branch of the business continued. Fortunately, there was no trouble with the men last year. The work was carried on quite satisfactorily; and it would appear that labour was now happy and contented in the Argentine. The prospects in the Republic were never so bright as at the present time; and the city of Buenos Ayres, where their business was carried on, was the centre and heart of all the prosperity. So he thought the Company might look forward to even more prosperous times than they had enjoyed up to the present, if they could only arrive at some mutually satisfactory arrangement with the Municipal authorities—and that had been their trouble. It might be remembered that last year he told the shareholders about the agitation among the authorities for a reduction in the selling price of gas; and he added that both the Directors and their officials in Buenos Ayres had had a very anxious time. It had been much worse in the past year. The shareholders had no doubt been expecting to be called to a special meeting in connection with this matter, as he promised would be the case when anything definite was arrived at. But nothing really tangible was obtained until last Wednesday. Before speaking of this, however, he would explain just what had happened during the past year. Shortly after the last meeting, the Intendente (the Lord Mayor), who had urged them to submit to him an *ad-referendum* project for the municipalizing in a term of 50 years of the Gas Companies, resigned; and the new Lord Mayor, with a Committee of the Municipal Council which was named to study the proposal the Directors had drawn up, and submitted after protracted conferences with their colleagues of the other two Companies (Buenos Ayres New and Primitiva), decided that they could not accept the conditions, though the Directors knew them to be quite fair and reasonable. The Directors placed all the books and accounts at the disposal of the authorities, so that they might check the figures, and see that they were only asking for about the same dividends as the shareholders had been receiving. They were then back again to where the negotiations started. The obnoxious ordenanza, or decree (referred to in his last speech,) still existed; and it was to have come into force on April 1 last year. However, the Directors succeeded in getting it prorogued until July 1, and commenced active negotiations with the Municipal Council. It would be wearisome to relate all that happened, and to tell of the innumerable meetings held with their colleagues of the other Companies to confer about cabled propositions from Buenos Ayres. Several times they seemed on the verge of coming to a mutually satisfactory arrangement; but some further exactions of the authorities, which could not be agreed to, always prevented their doing so. Meanwhile, time was slipping by. The Directors always had the obnoxious decree before them; and though they could always appeal to the Supreme Court for protection, they knew this would mean a great loss to the Company in any event, as they had no fewer than 32,000 customers in the city, and they would probably one and all have refused to pay their account at any higher price than that fixed by the decree in question, which price would have meant almost, if not quite, the ruin of the Companies. Again, with the utmost difficulty, they obtained a further prorogation of the decree to Sept. 30; and they were then told that this was the last chance. It could quite be imagined that the Companies were anything but happy at that time. Still they knew that they had to stand fast, and do everything possible to protect the interests of their shareholders; and notwithstanding all the red tape and the delays, they continued the negotiations as best they could. But Sept. 30 arrived; and they were as far as ever from an arrangement, as the Municipal Committee could not make up their minds what they wanted. The Company had to send out on Nov. 1 their October accounts (the accounts were rendered monthly); and the Directors were afraid they would not be paid. But on Oct. 28 the President of the Municipal Council proposed that, as a friendly solution of the actual difficulty, the obnoxious decree should be modified to the extent of fixing the selling price of gas for the remaining three months of 1908 and all the year 1909, at 2 cents per cubic metre less than they were charging up to then, but which price was very much above what the much referred to decree called for. There seemed nothing else to be done; so the Companies accepted this, stipulating that they must enter a legal protest against the right of the authorities to fix selling prices without reference to the Companies. This legal protest was duly made. In order that the shareholders might be able to thoroughly understand the position the Companies took up, he would read the cable sent out at this juncture:

> The Boards of the three Companies attended a joint meeting to-day, unanimously resolved that, in their judgment, the authorities are making a grave mistake in coercing Companies, as it will affect seriously the national and municipal credit in London, and will make it extremely difficult for the Gas Companies, and the railways, to raise the large amount capital required immediately for the development of the country. In their opinion, it would be very much wiser and better in the interest of the country to prorogue the ordinanza until June 30 next year, and so allow time for a friendly and final settlement of the whole question. But if the authorities still insist, we will agree to charge 22 cents until the end of the year 1909, with the understanding that we do not accept ordinanza in any shape or form, or recognize the right of the Buenos Ayres Municipality to fix price without reference to the Companies.

The Directors had not so far carried the protest to the Supreme Court, although their lawyers in Buenos Ayres told them that the Companies' rights were undoubted, and that the Courts would be sure to protect them. As would easily be understood, if at all possible, the Directors wished to arrive at an amicable settlement with the authorities, and so be enabled to work the business in peace and quietness. In a city like Buenos Ayres, it meant everything to have the authorities with them; and as the Directors knew they were asking nothing unreasonable, they still had every hope that, within a short time, they would arrive at a settlement which would satisfy the authorities and at the same time properly protect the interests of the shareholders. It might be that within a short time, the Directors would be able to again meet the shareholders with a scheme which would involve the amalgamation of the three Gas Companies trading in Buenos Ayres, as it seemed that the only way to thoroughly satisfy the authorities was to effect such economies as would allow of a further reduction in the selling price of gas. These economies could only be obtained by a fusion of the three Companies, who had separate mains in many streets of the city. He might add that negotiations to this end were considerably advanced, and even an adequate basis had possibly been arrived at with the Municipal Committee, but *ad-referendum* to the Council and, of course, to the shareholders. The Board had thought and hoped so many times during the last twelve months that they had settled with the authorities, only to find that they wanted something important changed, to which there could not be agreement, that he was diffident about making at present a decided statement. But he was glad to say he had received a cablegram that morning informing him that the *ad-referendum* contract had been signed. The shareholders might be sure, after what he had told them, there was no doubt about the Directors properly protecting their interests, and that any project they might decide to submit to the shareholders would be satisfactory from every point of view. The figures as to amalgamation had not been agreed on which the three

Companies should amalgamate. Possibly it would be on the basis of ordinary and preference shares to the shareholders; but he could not give the actual figures because they had not yet been arrived at. When, however, the Directors asked the shareholders to a meeting in the course of a few weeks, he should be able to satisfy them that their interests had been perfectly protected. The last two or three days different cables had come; but it was only that morning he had received the message saying the contract was at last signed—that was, between the Intendente and the Companies. It had still to be submitted to the Municipal Council; and, of course, when it was approved by the Council, it had to be submitted and approved by the shareholders of this and the other two Companies. He should be very thankful when it was all over, as the worry they had had for the last two or three years had been very trying indeed. Running next through the financial statements of the year, he said the revenue account showed a balance of £125,947, against £123,768 last year. When it was considered that the selling price of the gas was reduced by nearly 10 per cent. during the last three months of the year, this would no doubt be regarded as satisfactory. The balance was £105,192, against £104,600. The reserve fund was £185,000; and if the Directors' recommendations were approved, it would be £205,000. On capital account £36,758 had been spent during the year, which was some £18,000 less than in 1907. The principal items were £11,000 for 15 miles of new mains, and £18,000 for 3404 new house services. A new governor station had also been put up on the land at Flores. Their colleague Mr. Tulloch had just returned from Buenos Ayres, where he carefully inspected the various works, and went into all matters affecting the business; and he found everything was quite satisfactory. As to the appropriation of the balance at the credit of profit and loss account, it was proposed to add £20,000 to the reserve fund (making it £205,000), to give £2078 to the old age and pension fund (making it up to £7000), and to pay a final dividend of 9s. per share (free of tax), making the usual 8 per cent. for the year, so leaving £30,908 to go forward to next year, or (say) rather above £3000 more than was brought in.

Mr. C. P. OGILVIE seconded the motion; and, in doing so, he referred to the arduous duties the Board had had to perform during the past twelve months. He did not think they could have found a man in the City of London more capable of handling this matter than their Chairman. He had worked continually for the Company; and he felt sure that Mr. Bowen had the respect of every shareholder in the other two Companies. This was what made his position so strong both inside and outside the room. Day by day Mr. Bowen had been in the Company's office at work on a particular object. That object was to pull together with the Municipality. A year ago the Municipality wanted to put the Companies down to such a figure that it would have been impossible for them to live, or to pay the proper dividend that such an investment as a gas company was entitled to. It was their Chairman's work, and his work almost alone, that had brought them into the position they were in now. He believed the day was coming when they would be able to make an agreement, and a permanent one, with the authorities.

The motion was unanimously carried.

Moved by the CHAIRMAN, and seconded by Mr. C. J. HEGAN, a final dividend of 9s. per share was declared; making, with the interim dividend of 7s. per share, 8 per cent. for the year, free of income-tax.

The Chairman and Mr. Ogilvie were the two retiring Directors, and they were unanimously re-elected, as were also the Auditors.

Mr. TULLOCH proposed a vote of thanks to the Secretary and staff in London, to the Chairman of the Local Committee, and to the General Manager and Engineer and staff in Buenos Ayres. He spoke of his visit to Buenos Ayres, and stated how pleased he was with all he saw at the Company's works, and how loyal and diligent he found their officers and staff.

The CHAIRMAN seconded the motion; and it was heartily passed.

Moved by Mr. SKEEL, and seconded by Mr. A. W. OKE, a cordial vote of thanks was also passed to the Chairman and Directors.

The CHAIRMAN made acknowledgment on behalf of himself and his colleagues; and the SECRETARY on behalf of the officers and staffs at home and abroad.

The Water-Gas Question at Limerick.—A Whole House Committee of the Corporation of Limerick have decided (the Mayor and Mr. T. Ryan dissenting) that the project to expend £5500 on water-gas plant should not be proceeded with by the Gas Committee. Counsel's opinion was obtained, and was to the effect that the Committee could not legally go on with the work without the consent of the Corporation; but the Mayor has declined to be bound by the vote of the Whole House Committee.

Municipal Trading at Birkenhead.—Addressing the Birkenhead Town Council on the existing financial position, Mr. T. L. Dodds remarked that capital expenditure showed a disposition to go up by leaps and bounds. If the rates were to be kept down, some return must be obtained from the trading departments; and he had always held that municipal trading concerns ought to be productive of profit. In twelve years the total capital expenditure had been increased by £674,659, which had been largely reduced by the operation of the sinking fund during those years. It was expected, if capital was largely augmented, there would be some proportionate increase of income. This was not so, however. In 1896, the income from all trading concerns amounted to £12,030; while last year it was £11,000. The Corporation had invested in trading concerns £1,135,280; and the profit was £11,750—less than 1 per cent. on the capital invested. If this 1 per cent. were added to the 2 per cent. which was set aside for sinking fund, it made a total profit of 3 per cent.; and out of it must come the depreciation. This was not satisfactory. In 1896, the total debt was £1,211,730; while this year it was £2,153,465. He had come to the conclusion that in fourteen years they would have practically doubled the debt which it took the Commissioners and the Council up to 1896 to accumulate. Earlier in the meeting, Alderman Oldam, the Chairman of the Finance Committee, stated that the Gas Committee had come out nobly. They estimated last year that they would receive from the Gas Committee £9500; but, as a matter of fact, they had received £11,638—an increase of over £2000, which increase was equal to a penny rate.

MANCHESTER GAS PROFITS AND THE RATES.

A Smaller Contribution for the Current Year, or Dearer Gas.

Dealing with the estimates for the current year and the prospective rise in the rates of the city, the "Manchester Guardian" last Tuesday made the following remarks with regard to the contribution to be expected from the Gas Department.

"The statement that the Manchester Gas Committee cannot afford any longer to give sums of £50,000 or £60,000 in relief of the city rates will cause surprise and help to occasion a rise in the rates. When the City Council the other day agreed to keep the city requirements within the cost of a year ago, so that the only advance in the rates would be due to the Ship Canal rate, it was on the understanding that the Gas Committee would be able to contribute at least £50,000. This has been the sum handed over by the Committee for many years, except when, as last year, they have raised the total to £60,000. The Committee now find they cannot afford either sum. Last year their surplus was £26,894; and to make up the £60,000, they took £33,106 from their reserve fund. For the current year, the Gas Committee estimate their profits will reach £26,595; and as they have no reserve fund now to draw upon, they decided yesterday that the sum named is all they dare offer in relief of the rates. Even then they think it is contrary to the rules of sound finance not to build up a good reserve fund. If the Council insist on the usual contribution, it means raising the price of gas. In that case, they feel there would be a protest on the ground that the rates of the ratepayers who do not use gas were being eased at the expense of the gas consumers, many of whom are poor. Figures submitted to the Committee yesterday show that £759,026 was the estimated expenditure for the past year, and £779,800 was the estimated income, leaving a balance of £20,774. As a matter of fact, the expenditure was £734,791, and the income £761,685; so that the balance was £26,894. For the current year the income is estimated at £761,685, the same as last year; and the expenditure is put down at £733,605, which is £1186 less than last year's amount—leaving the prospective balance at £26,595."

After referring to the finances of other Committees, our contemporary concludes: "It is obvious that the task of arranging matters so as to keep the rates from increasing is more difficult than was at first imagined. The Finance Committee will find it hard to get departments to make demands commensurate with the big drop in the gas contribution. The latter in itself is equal to a rate of 2d. in the pound."

COVENTRY CORPORATION GAS UNDERTAKING.

Application for Additional Powers.

Mr. F. J. Willis, one of the Inspectors of the Local Government Board, held an inquiry at Coventry last Thursday in regard to an application by the City Council for a Provisional Order to amend, by the insertion of new clauses, the Coventry Gas Act, 1856, the Coventry Corporation (Gas Purchase) Act, 1884, and the Coventry Corporation Gas Act, 1898. The Corporation also sought powers to enable them to inspect gas-fittings in new buildings, compel consumers to use effective anti-fluctuators or other apparatus for controlling and regulating the supply of gas to engines, prevent gas-fittings (including stoves and cookers) let on hire being subject to distress, and substitute improved methods of testing the illuminating power of the gas for those at present prescribed. It was also asked that the Provisional Order should give the Corporation power to specify the size and material of the pipes and fittings laid by the consumer between the main and the meter on his premises, control the position of meters so as to make them easier of access, require notice to be given of the laying of pipes or the placing of meters, and refuse to supply gas to premises until these provisions have been complied with.

The Town Clerk (Mr. George Sutton) explained that in some cases the pipes put in were too small for the consumption of the house, and the result was that there was insufficient pressure. The occupier was apt to attribute this to the Gas Committee or to the quality of the gas, whereas it was due entirely to the pipes being too small. The Corporation had done a little in the way of putting in fittings in tenement property, and the gas-fitters of the city had objected, as it interfered with their province. Recently the Gas Manager (Mr. Fletcher W. Stevenson) had an interview with them, and they intimated that they would be very pleased to fall in line with any specification which the Corporation might impose. At present, however, the Corporation had no power to do it; and they would like to have it.

There was no opposition to the application.

GOWERTON AND DISTRICT GAS COMPANY, LIMITED.

Statutory Meeting in Private.

The Statutory Meeting of the above-named Company was held in Swansea a few days ago, under the presidency of Mr. W. John. Ten shareholders (two being ladies) answered to their names. At the outset, the Solicitor (Mr. C. W. Slater) called attention to the fact that reporters were present; and, after some discussion, they were requested to withdraw, on the understanding that an official report would be supplied to them at the close of the meeting. This was done; and it furnished the following particulars: The Directors' report was received and adopted, and the action of the Directors, as set forth in the notice calling the meeting, affirmed. The three local Directors—Messrs. W. John, Henry Vivian, and W. Williams—intimated their intention of materially increasing their shareholding in the concern. Mr. Chaplin (Cardiff) and Mr. W. E. Morgan (Hafod) were added to the list of Directors. Sir Charles Buckworth Herne-Soame, of Dawley, Salop, the Chairman of the Directors, intimated that, owing to differences of opinion with the local Directors, he did not seek re-election.

The local papers in which the foregoing report appeared contained

the following additional particulars: From the report of the Company which has been filed at Somerset House, it appears that the total number of shares allotted is 1021, of which 717 have been fully paid up. On the remainder, £670 is unpaid. The total amount of cash received in respect of shares issued wholly for cash is £4435. The amount paid in expenses so far is £1997 7s. The Water-Works, Lighting, and Power Investment Corporation, Limited, claim that 60 shares were allotted to them as nominees of the Contractor, and that they are entitled to them as fully paid. They also claim to hold 80 first mortgage debentures of £10 each, part of an issue of 200 such debentures alleged to have been made on the 2nd of January last. The Company deny the validity of these debentures. The balance (120 debentures) of such alleged issue were sent to the Contractor by the Corporation, but have been delivered up to the Company's Solicitor for cancellation. An action in regard to the matter is pending in the High Court.

GAS MANAGERS AS MUNICIPAL COUNCILLORS.

We have on several occasions recorded with gratification the election of a gas manager to serve on the governing body of the town in which his professional duties are discharged. This feeling has been engendered by the consideration that a man possessing the qualifications necessary for superintending the working of a gas undertaking must be quite as capable as a local butcher or greengrocer of representing and studying the interests of the ratepayers. It would be out of his power, even if he were so disposed, to use his position to the advantage of his company, inasmuch as he would not be able to vote on any question in which they were concerned. There does not, therefore, seem to be any reason, except spite, for endeavouring to oust a gas manager who has been duly elected a member of a council. Yet this appears to be the desire of the Socialist and Labour party in East Cowes, of the Urban District Council of which place Mr. Robert Fish, the Engineer and Manager of the East Cowes Gas Company, is a member, having been elected for the second time without issuing any address or soliciting votes.

At the last meeting of the Council, a letter, signed by certain ratepayers and parochial electors, was read, in which they expressed a wish to know whether Mr. Fish had any legal right to sit on the Council. The Clerk (Mr. A. Damant) said he had several times told the Council that, in his opinion, Mr. Fish was not disqualified from membership by reason of his being a shareholder in his Company; the only thing was that it would not be legal for him to vote on any question relating to the concern. Mr. Floyd urged that Mr. Fish was not only a shareholder but a Director and the Manager of the Company. As a Manager he no doubt received a salary, part of which was money paid by the Council for gas, and came out of the rates. If this was so, Mr. Fish could not legally sit on the Council, because he was receiving money out of the rates. In order that the question might be settled once and for all, he moved that it be referred to the General Purposes Committee to be fully considered and reported upon. Mr. Board said the subject had been discussed at the Council several times. Perhaps Mr. Floyd forgot that, seeing the Council themselves held shares in the Company,* each councillor was a shareholder. The letter was very bad policy, and he was surprised at some of the people who signed it. It was easy to see whence it emanated. The ruling of the Clerk should surely be sufficient. Mr. Trowbridge said that to him the letter appeared to be a bit of petty spite. Mr. Fish did not get unseated at the last election, and perhaps some people wanted to make a little fuss about it. If it was illegal for him to sit on the Council, it was also illegal for some of the other members to do so. Mr. Glasspell said it seemed that the Council did not know where they were in the matter, and, not out of any ill-feeling, but just to know how they stood, he would move that the Clerk should write to the Urban District Councils Association and ask for a ruling. Mr. Groves seconded the motion, on the understanding that all cases as to which a question could be raised should be investigated. He did not know why Mr. Fish should be singled out, because other members' legality might also be questioned. Mr. Floyd said his main contention was with regard to the position of Manager held by Mr. Fish. Mr. Glasspell's motion was carried.

* Shares to the nominal value of £200 were some years since given to the town by the late Lord Gort.

Bombay Gas Company, Limited.—The Directors of the Company report a further expansion last year in the sale of gas to private consumers and for public lamps; the latter resulting from the decision of the Municipality to abolish the practice of extinguishing lamps on moonlight nights. There was an increase of £1753 in the rental from private consumers, and of £3360 in that for public lighting. The accounts accompanying the report show a profit of £15,962 on the net revenue account; making, with £3225 brought forward, £19,187 available for distribution. The interim dividend paid in December absorbed £7200, and the Directors recommend a dividend of 3½ per cent., free of income-tax; making 6½ per cent. for the year. This will leave £3587 to be carried forward.

Water Scheme for Diss.—Mr. W. H. Booth, the Engineer appointed to carry out a water supply scheme for Diss, has written to the Council in respect to particulars required by the Local Government Board. He suggested that, in view of the attitude of the Local Government Board, it might be desirable to fall in with their views, and apply for sanction for a preliminary loan for experimental boring and incidental expenses. Mr. Booth estimated that the cost of boring would be £260; and if the Board insisted upon a long pumping test, he should recommend that application be obtained for sanction to a loan of £400, as any surplus could be merged into the larger sum to be borrowed for carrying out the work. The Council resolved to make application to the Board for sanction to borrow the sum of £400 for experimental purposes.

SOUTH METROPOLITAN COMPANY'S RATING APPEALS.

Bermondsey Borough Council and Messrs. Dinwiddy.

The objections of the South Metropolitan Gas Company to the passing of the accounts for 1907-8 of the Woolwich and Greenwich Unions and the Bermondsey Borough Council, on the ground that various amounts paid to Messrs. Dinwiddy and Sons (representing the taxed-off balances of their bills of costs against the Company, after the latter had lost their appeals against the 1905 valuations) should be surcharged against the Local Authorities, concluded, as already reported in the "JOURNAL," a few weeks ago. The result so far is that Woolwich has been surcharged £143 16s.; at Bermondsey, the Auditor having intimated that there would be a surcharge of £112, and possibly more, Messrs. Dinwiddy refunded £122 17s.; and at Greenwich, the firm having accepted 50 per cent. of their bill in settlement, the Company only entered formal objection to maintain their status, and the half payment was approved by the Auditor. Messrs. Dinwiddy have since addressed a letter on the subject to various local papers in Woolwich, Bermondsey, and South London generally, and in the course of it have stated as follows with regard to the Bermondsey proceedings: "The Council, after taking an eminent Counsel's opinion, paid us an excess over our original claim; we spontaneously refunding that difference to protect our clients from the obvious surcharge to which their own generous action had exposed them."

This statement was the subject of questions at the last meeting of the Bermondsey Council. On the *agenda* was a report from Mr. A. Carson Roberts, the Auditor, on the subject of the Gas Company's objections to the accounts. In this he stated that he finally decided to disallow £115 off the account paid to Messrs. Dinwiddy, but that a surcharge had been obviated because, after the meeting at which he said he had already decided, up to that point, to disallow £112 (subsequently increased), the firm in question had refunded to Bermondsey £122 17s. Mr. J. Oake took exception to Messrs. Dinwiddy's statement that the Bermondsey Council had paid them more than they claimed, and that the refund was spontaneous on their part; and he asked the Town Clerk a series of questions on the subject. The Town Clerk's reply was that Messrs. Dinwiddy's claim was originally for £775 15s.; and that underneath this amount they had put "Less rebate £122 17s." They explained in a letter that the rebate was given because they had done some similar work for two or three other districts. The Assessment Committee and he (the speaker) thought the charge excessive; and he communicated with Messrs. Dinwiddy, who replied that as the bill was disputed they would require the full £775 15s. Counsel's opinion was then taken, and it was to the effect that the Council were liable. The full amount was accordingly paid in February, 1908, and nothing further was heard of the matter till the Auditor came to investigate the accounts for 1907-8 and the Gas Company entered their objections. It was only this year, after the Auditor had decided to disallow £112, that Messrs. Dinwiddy sent a cheque for £122 17s., the amount of their original offer of rebate. He did not call this return a "spontaneous" one, nor did he call it a "generous action" for Bermondsey to pay a bill which Messrs. Dinwiddy had demanded, and for which Counsel had said that, under their contract, the Council were liable. In answer to a further question, the Town Clerk said that, in his opinion, if Messrs. Dinwiddy had not refunded the amount, and the Council had been surcharged, the latter would have had cause of action against the firm. Mr. Oake said he hoped his colleagues would remember this incident when the question of appointing a quinquennial valuer came up for consideration.

HAVERHILL GAS-WORKS EXTENSIONS.

At the Meeting of the Haverhill Urban District Council on Monday of last week, there was submitted a report of a special meeting of the Gas Committee, which showed that they had considered plans of the proposed extensions necessary to the gas-works, and recommended that three additional benches of retorts be constructed on the Winstanley system, with the necessary building and alterations to the existing plant, at an estimated expenditure of £1575. The Committee recommended that a loan of £1000 should be raised on account of the expenditure, and that the Council be asked to apply to the Local Government Board for their sanction, authorizing such loan to be repayable in twenty years; and also that the Committee be empowered to undertake such work as they could carry out themselves, which should be paid for out of revenue account.

In moving the adoption of the report, Mr. Coster said the proposed work had been in the minds of the Committee for some time. They had known that they were gradually getting towards the date when the works would have to be extended; and the various alterations had been made with this end in view. It was obvious it was hardly worth while to extend a system which was of the very earliest type, when it was remembered that all the works in the country of any size were now carbonizing coal on the regenerative plan; and the Committee thought that now was the time to adopt a tried and proved system, and one which would give the most efficient results. They proposed to instal three retort-benches; keeping one as a stand-by. The Committee had had an interview with the patentee of the system; and he had offered to guarantee the capacity, the efficiency, and the life of the work. So the Committee felt they were not going into the matter blindfold. The reason they asked for the loan for twenty years was that the Committee knew the profits from the alteration would be ample to repay the loan and all the interest, and still give them a considerable amount to spare.

In the course of the discussion which ensued, Mr. Unwin asked whether it was fair that so much money for the extensions should be taken from revenue. Why should not £1200 or £1500 be borrowed? Had the Committee any idea of what the minimum price of gas should be before the rates received part of the profits? He quite admitted that the gas consumers had the first claim; but when the gas got down to what he called a very low limit, the profits should be devoted to the relief of the rates. He should think a low limit for the price of gas

would be 3s. per 1000 cubic feet. In reply, Mr. Coster said that, when they came to think that in about seven years' time the ratepayers would stand in the position of owning gas-works which they, as ratepayers, had never contributed a penny towards, he did not see that the ratepayers ought to raise the question of the price of gas at all. He thought it was the consumers who should have the first consideration. The ratepayers had never been taxed in any way for the benefit of the gas consumers of the town. The consumers had, besides keeping the works in repair, paid for them; and they had been taxed for their own benefit. He would very much like to see the price of gas at 3s. per 1000 cubic feet. He should not care to promise such a thing in the immediate future; but it was not by any means a vision. It was quite practicable; and he hoped to see it.

The report was adopted.

VALUE OF INDUSTRIAL CO-PARTNERSHIP.

In the course of a lecture on "Co-Partnership," delivered under the auspices of the Chartered Institute of Secretaries last Wednesday by Mr. Russell Day, B.A., he remarked that, in order to carry on trade, in addition to capital and labour, there was a third essential element—viz., ability or brain power to control the others. These three should work in perfect harmony to produce the best results. Strikes had cost millions, both to labour and capital, and had caused loss of trade to the nation, besides driving capital out of the kingdom. There had been more than 300 endeavours by employers and workmen in England to work on profit-sharing and on co-partnership lines; but the late Sir George Livesey was the man who first introduced it on a large scale, at the South Metropolitan Gas-Works. There were now fifteen gas-works in which the system of enabling workmen to become shareholders had been adopted; one of the last being the Gaslight and Coke Company, whose scheme affected some 10,000 men. The root of the whole matter seemed to be thrift. It improved the good character workmen mostly possessed, and strengthened them to resist unsound principles tending to deteriorate character and foster discontent. Differences would be arranged by the Committees, and good trade would bring happiness to all.

Speaking at West Hartlepool last Thursday, on the occasion of being made a freeman of the borough, Sir Christopher Furness, M.P., made the following remarks on the subject of co-partnership: "It may not be too strong a thing to say that the future of British industry hangs on the development of labour co-partnership. I am entirely satisfied that the system, with the loyalty, the intelligence, the zeal, and the industry which it brings into play, will enable us to confront our rivals, wherever they arise. Indeed, I appraise the system, with its invaluable adjunct of a works council, so highly that, in view of the peril which has for some years past environed the future of British industry, I am strongly disposed to urge that it shall, in some form or another, be brought into operation in every trade to which it can be made applicable throughout the kingdom. Co-partnership has lately been denounced as a fraudulent device designed to squeeze labour for the benefit of capital. The extreme political theorists who promulgate this view conceive that the joint reward of the rare initiative and continuous responsibility of enterprise, the helpfulness and sustaining capacity of capital, and the skill and strength of labour, shall be the reward of labour solely. But is such a proposition likely to commend itself as either just or practical to men having any claim to fairmindedness or proper cognizance of the realities of things? If we wish to sustain our supremacy, if we wish to lead the lives of self-respecting Englishmen, worthy of the race from which we are sprung, we must doff the garb of frivolity and cease to view life as a piece of play; we must throw off our personal self-conceit and our national complacency, and become earnest students of our industrial and commercial environment. We must manifest, as never before, initiative, zeal, energy, care, ability, industry. The best available instrument for meeting and overcoming this crisis of our national life is the principle of co-partnership."

Frequency of Suicides by Gas.—Dr. F. J. Waldo, while holding an inquest in the City on the body of a man named Randall who had committed suicide by turning on two gas-jets and stopping the ventilation of the room, remarked that cases of coal-gas poisoning had been progressively on the increase in large cities during the past ten years. Now that it was more difficult to get poisons, people seemed to turn the gas-taps on.

Chesterfield Water Supply.—A Local Government Board inquiry has been held at Chesterfield with regard to an application by the Gas and Water Board for sanction to a loan of £41,000 for reservoir and water-works purposes. The Law Clerk (Mr. John Middleton) said the expenditure authorized by the Board's Act, and under which they acquired possession of the old Gas and Water Company's undertaking, had been exceeded. The Board had constructed a new reservoir, the capacity of which had been increased by 18 million gallons to 238 million gallons by certain additional excavations which were not originally intended, and which were occasioned by the uncertainty which was inseparable from reservoir making. The excess expenditure entailed had been defrayed out of the accumulated profits of the undertaking; and when the loan was granted, the amount would be repaid. Mr. E. M. Eaton (one of the Consulting Engineers to the Board) stated that he was thoroughly satisfied with the manner in which the construction of the new reservoir had been carried out. He had frequently been consulted as to the best methods of dealing with the geological difficulties which had arisen, and which were not made apparent by the trial holes; and the way in which they had been got over was undoubtedly the best. The figures of the cost anticipated to complete the scheme were based on the actual outlay on the work so far; and were perfectly accurate. Mr. W. B. Bryan (the other Consulting Engineer) informed the Inspector that £68,729 had been expended; and that he estimated £3500 would be required to complete the scheme. This could be done within three months. The overflow from the two old reservoirs during nine out of the past ten years had been sufficient to fill the new reservoir once a year.

SOME COMPARISONS OF GAS AND ELECTRICITY.

The "Daily Telegraph" last Tuesday contained an interesting article comparing gas with electricity. It was apparently called forth by the recent announcement by the South Metropolitan Gas Company of a reduction in price at Midsummer. The action of the Company, who, the writer acknowledged in his opening paragraph, have "consistently tried not to be exorbitant," and who, compared with many other suppliers of gas, have been "reasonable, even generous," forced into consideration many points; and these he dealt with as follows:

The Inherent Vitality of the Gas Industry.

Nobody can fail to see that in this step is an indication of an intention to meet and check the advance of electricity as a civic and domestic commodity. A naval parallel might almost be ventured—with improvements. The power-standard of gas has been threatened. For almost a century it was predominant over all other similar agencies combined for lighting or heating. It has now a formidable, energetic rival—electricity. The balance of power is becoming nearer equal day by day. In a few years the scales may possibly be turned. Electricity may dominate and gas be subverted. Apparently this can only be prevented by the inherent vitality and active development of the gas industry. And there are evidences that both exist. In other words, feverish as the attempt has been to overtake and outstrip the old force, the old force is showing itself capable of sustained and even successful resistance. It abides on its merits. Witness the progress of the gas industry of the United Kingdom between 1880 and 1906. The capital employed increased by 125 per cent., the revenue received increased by 100 per cent., the coal used increased by 83 per cent., and the number of consumers swelled by 175 per cent. And during the latter part of this period the uses and advantages of electricity were being advertised with supreme energy. Even later computations show that, notwithstanding variations in the price of residuals, gas dividends have been steady, whereas the dividends of the rival concerns have diminished. In this situation, cool-headed men, like Sir Oliver Lodge, will entertain "great hopes for both;" basing them mainly in the case of gas on its cheapness, and in the case of electricity (for some considerable period, at any rate) mainly on its luxury.

Official Preference for Gas.

There is an official view to be regarded on this subject bearing on the cost, on which, granted equality, or even approximate equality, in other respects, ultimate supremacy must depend. Time and again when Government inquiries have taken place into the application of local bodies for power to borrow for electrical undertakings, Local Government Board officials have advised very careful consideration of the advantages of street lighting by gas before adopting electricity. This happened quite recently at Watford, at Bexley, and at Hounslow. Said one: "Electricity means that you are giving less light and charging more for it." Nor does this thinly-veiled official preference bear alone on street lighting. It embraces public institutions. The Parliamentary Committee appointed in 1907 to inquire into (among other things) the lighting and heating of Poor Law institutions, say in the parliamentary paper recently published: "On the whole, it does not seem to them (the Committee) that there is adequate evidence to justify the substitution of electricity for gas at institutions where gas is already in use." And even the most ardent advocate of electricity must concede a very considerable civic endorsement of the official view as here indicated. Numbers of instances can be cited of a trial of electricity for street lighting and its abandonment in favour of the old system, not alone on account of the cost, but also of efficiency. Islington has its own electric works, but finds it cheaper by nearly half to light an additional fifteen miles of streets by gas than by electricity, though its gas has to be purchased from a Company which derives profit from the sale. St. Pancras also has its own generating works; but against £18,000 profits in relief of the rates in the last ten years, it has to set off £35,000 more paid for street lighting in the last seven years. Camberwell is wedded to gas, and lights its streets at a cost of £80 per mile, as compared with an average of £183 per mile for the whole of London. Since it introduced electric street lighting, Long Eaton has increased its burden on this score from £630 to £1367; and Whitby has saddled itself with an additional £600 (from £1000 to £1600). Manchester, Birmingham, Bradford, and other big towns in England and Scotland owning generating works, find it best to employ gas, and use that medium in all their new streets. In Liverpool, the relative cost per mile of gas and electric lighting is £120 and £500. In the City of London we have another illustration. The adoption of electric lighting for a few of the main streets proved so unsatisfactory that gas was re-introduced, and a saving of £400 a year effected. Many people declare also that the lighting is now better. In Fleet Street an experiment is being tried with high-power inverted incandescent gas-burners, and the lighting has this advantage—that it illumines the footways, which most need it.

Questions of Reliability and Cost.

There is a third point of importance deserving attention in regard to this literally "burning" question. Cost and efficiency are of first-rate interest; but reliability is not to be ignored, and those who go deeply into the subject are far from underrating it. Naturally they seize upon anything that weighs one way or the other. In this respect they claim to have laid on a substantial fact telling against electricity. What a breakdown or a strike at an electrical generating station means, we all know. The light at once fails, and darkness obtains. If the boilers are not constantly fired, the sources of energy are dispelled, and there is no reserve to be drawn upon. With gas, it is somewhat different. It is a negligent company which has not sufficient supply for a day stored in its holders, so that if a strike occurs or machinery breaks down there is at least a little time in which to fill vacancies and effect repairs. This, however, is a disparity that doubtless time and ingenuity will remove. To narrow the sphere of observation, approach the subject from the shopkeepers' and householders' standpoint. To the shopkeeper two

questions present themselves—brilliancy of lighting and expense. At all costs, he must have attractive lighting, if he has a spark of enterprise in him. And the probability is that if the brilliancy he secures brings a return in hard cash, he will not seriously cavil at the cost. The moot point is whether, with the improvements now effected in gas-lighting apparatus, he does not find gas serve him equally as well as electricity. Especially since the inverted mantle made its appearance has he been disposed, when meditating alterations, to try to adapt his existing fittings, rather than be fitted out with electricity. Many estimates have been made as to the cost he may have to meet through his choice between the two mediums. Taking 1500 as the number of hours a shop has to be lighted throughout the year, and the light required to be 1000-candle power, the expense has been worked out at, respectively, £65 for gas and £320 for electricity. This is a wide disparity, sufficient, indeed, to suggest pause to any tradesman, however enterprising. It may be exaggerated. But none venture to say that the difference would not be very considerable, and that, accepting these figures, something more is needed than even a trifling addition of brilliancy to justify the change—the consideration, for instance, of less harm being done to stock by electric light than by gas.

Gas from the Householder's Standpoint.

Between the rival candidates for power, the real bone of contention is the householder; and strenuous are the efforts made to secure his adhesion. At present the object of the strife is faced by several concrete facts. The electricity he uses for lighting costs him more than gas, and electricity for cooking and heating cannot be supplied to him at anything like a practicable or a reasonable figure. From these facts there is no hiding. Gas holds the field for lighting, cooking, and heating, so far as cost is concerned, at the present moment. Electricity is alleged to have hygienic and physical advantages. But even these are being disputed and met by counter-developments. While the tenant examines with startled eyes his swollen lighting account, the cleanly wife, gazing at the ceilings, endeavours to assuage his alarm by pointing out their pure whiteness. "But," says the scientific gas advocate, "that whiteness cloaks a danger. It is not the fumes from gas that discolour a ceiling, but the upward current of hot air created by the gas, which carries with it floating particles of dust and dirt and lodges them there. And in that upward current you have a means of ventilation which no electric lighting apparatus can supply. Besides, in your room there are numberless bacteria hovering around. There they remain in place when electricity is the illuminant; but a gas-flame draws them to it, consumes them, and saves you from untold ills." This may seem to some the *reductio ad absurdum;* it contains one wholesome point—that gas is a valuable means of ventilation which is too often left out of account. That the healthiness of an apartment is necessarily increased by the substitution of electricity for gas is not a safe assertion. The new Central Criminal Court is an illustration to the contrary. Apparently built on the best known principles, and electrically fitted throughout, it yet arouses bitter complaint on the score of ill-ventilation. Where human bodies are congregated, vitiating elements are exuded which, in the interests of health, should be dispelled. Artificial ventilation is therefore a necessity in all enclosed spaces which are inhabited. Gas, say the advocates of that commodity, ensures ventilation if properly regulated, and electricity does not. Therefore, before electricity can be said to equal gas hygienically, it must be developed in relation to new principles of ventilation.

The Merits of the Rivals.

Into these intricacies of rival virtues one might penetrate still deeper, but they go too far away from the broad considerations which influence the average consumer when he is asked to make his choice of one or the other medium of lighting. Given an equality of price between gas and electricity, it may safely be assumed that choice of the latter would prevail on account of its obviously greater cleanliness and convenience, but not on account of its superiority as an illuminant, for invention has annihilated the disparity which manifested itself when electric lighting was first introduced, and, indeed, put gas on quite a new plane of value in this respect. For cooking purposes, electricity is yet in the infant stage. It is infinitely more costly than gas cooking, and cannot even be regarded as in the lists in respect of heating.

So the war will continue, with fluctuating passages. Electricity has made a bold advance and secured a substantial hold; but the movement has not driven away its rival. On the contrary, since the strife began, the uses to which gas may be put have been greatly multiplied, and its inherent qualities improved to an extent which seems just now to ensure it permanent preference in the choice of a very large section of the community. The feasibility of reducing gas prices while the rivalry is so keen is greatly exercising the minds of producers of the more costly commodity.

Water Supply in Chichester Out-Districts.—The Chichester City Council have agreed, on a report from the Sanitary Committee, to an extension of the water-main to Bosham, at an estimated cost of £740, and to Chidham, at the boundary of Westbourne, at an estimated outlay of £1100. A pipe is already laid towards Chidham, and the £1100 will be spent only in the event of the Westbourne District Council intimating their willingness to enter into a contract to take the Chichester water at a charge of 6d. per 1000 gallons. The new districts named are now depending for their water solely upon wells.

Tarapaca Water-Works Company, Limited.—The Directors of the Company report that the net profit for the past year amounts to £56,451, which, added to the balance of £747 brought forward, and allowing £1014 for income-tax, makes a total of £56,184. An interim dividend was paid on Oct. 1 last at the rate of 3½ per cent., absorbing £14,000; leaving £42,184 to be dealt with. The Directors recommend a final dividend of 4 per cent., making 7½ per cent. for the year, and the placing of £20,000 to the reserve fund. This will leave £6184 to be carried forward. The sanction of the Court to the reduction of the capital had not been obtained before the close of the accounts; but, as has already been recorded in the "JOURNAL," it has since been given, and the return of £2 was made on the 10th ult. The final dividend of 4 per cent, will therefore be paid upon £10 per share.

THE AIR-GAS EXPLOSION AT TELGATE.

Explanation by Messrs. Strode and Co.

In the "JOURNAL" for the 23rd of February last (p. 557), we gave some particulars—obtained, as was then stated, from "Carbid und Acetylen"—of a serious explosion at the air-gas works established at Telgate, in Westphalia, for the supply of the town. The works were erected by the Aerogen Gas Company of Hanover, who obtained a concession for the sole public supply of light to the town for a period of thirty years; and the publication of the report of the occurrence in our German contemporary naturally directed attention to the question of the safety of their system. We have received from Messrs. Strode and Co., of Osnaburgh Street, N.W., who, we learn for the first time, are representatives of the Company in this country, a statement they have had from Germany in regard to the matter. It was mentioned in our report that the cause of the explosion had not then been satisfactorily made out. We are therefore pleased to be able to throw some light on the subject by publishing the explanation furnished by Messrs. Strode and Co., which is to the following effect; and, needless to say, we much regret having been misled into publishing a translation of the inaccurate statements of our foreign contemporary.

With reference to the explosion of aerogen gas at Telgate, in Westphalia, on the night of the 2nd of February, the matter has been carefully investigated by unprejudiced experts, with the result that the explosion was found to have taken place in the gasometer house. The attendant, who is described as a periodical drunkard, kept the machine running in spite of the gasometer being full; and, in consequence, the gas blew through the water into the house for hours. His duty was to fill the gasometer late at night, when all the lights are out; but in his unfit state he fell asleep, and at two o'clock in the morning entered the house with an open light. In spite of the great quantity of escaped gas, the effect of the explosion was comparatively weak—damaging the gasometer, and knocking down the walls of the house. The *débris* of the wall damaged part of the machinery. The petrol contained in the plant ran out, and burnt without doing further damage. The underground petrol storage, containing at the time more than 350 gallons, stood the test splendidly, and remained quite uninjured. All the experts agreed that with any other gas the result of the explosion would have been terrible—at any rate, far more disastrous than with aerogen gas. In this case, the plant was repaired in a few days and the gas supply maintained.

The installation, which was erected in 1901, is one of the oldest aerogen installations for town lighting, which, it must be admitted, had not been fitted with the Company's modern safety arrangements; but the plant has been in use continually for more than seven years, and all the town residents were always pleased with the light. There is not one breakdown on record during all the time, in face of the fact that a rather careless person attended to the installation. The aerogen plants of latest construction are fitted with safety mechanism which automatically stops the production of gas at the moment the gasometer is full; consequently, any accidents of a similar nature are now absolutely impossible. After all, aerogen gas has stood this test splendidly when compared with coal gas, to say nothing of acetylene, with which this explosion would have been a terrible catastrophe. Both governmental and municipal authorities have not hesitated for a moment to allow the re-erection of the plant.

The Company who own the installation and run the business in Telgate write as follows:—

> Dear Sirs,—As requested, we are pleased to say that the explosion was not due to the quality or to the mixture of aerogen gas. The machine has been in use for more than seven years, and we were always pleased with the results. The cause of the accident can only be carelessness of the attendant, or even malice. We are now practically convinced that it was malice by someone, because only a few days ago we discovered a fire in the plant-house; and, upon investigation, the door to the house, which should always be locked, was found open, and all the petrol taps were open too, so that the petrol had run on the floor and presumably was then set on fire. We hope that the police may succeed in clearing the matter up.
>
> (Signed) The Gas Company, Telgate, Limited.
>
> A. SCHRADER, NIEMANN } Directors.

In Germany the public now know aerogen gas as the least dangerous of gases. Aerogen gas machines are in use in the Imperial demesne, Cadinen, and in the Imperial castle, Hubertusstock. The National Railway Company of Mecklenburg Schwerin has only recently replaced an acetylene installation with an aerogen machine, at their Kleinen Station. A good many sanatoriums, hospitals, &c.—*i.e.*, places where safety is the first requirement—have aerogen gas. The installation has since been repaired by the Aerogen Gas Company; and the order was placed in face of many most inviting offers on the part of competitors.

LINCOLN CORPORATION WATER SUPPLY.

Proposed New Reservoir and Water-Tower.

At the Guildhall, Lincoln, last Tuesday, Major C. E. Norton, R.E., held an inquiry in regard to an application made by the Corporation to the Local Government Board for sanction to the borrowing of £54,000 for the construction of a reservoir and other works at Bracebridge Heath, a water-tower at Westgate, and for laying mains to connect these works.

The Deputy Town Clerk (Mr. W. T. Page) explained that the original application to the Board was for £60,000, but that it had now been reduced to £54,000. Under the Provisional Order of 1906, the Corporation had power to borrow £200,000; but it was reduced to £70,000. Already £16,000 had been borrowed, and there now remained only

£54,000, which the Council wished to borrow for the longest period possible. The money was required for the construction of a reservoir, with a capacity of 6 million gallons, a water-tower, with a capacity of 300,000 gallons, and water-mains between them. A tower was necessary for the higher parts of the city, in order to get a more adequate supply of water at all hours; and the reservoir was required for storage. The tower was proposed to be enclosed in some suitable materials, having regard to the very public position it would occupy. It would be about 130 feet high and 60 feet wide. The Water-Works Engineer to the Corporation was supplying a number of alternative designs for closing-in the tower, and the estimate for the cost was based upon one of them; but the Corporation were going to confer with an architect of eminence, and it was quite possible that another scheme might be adopted. As far as he (Mr. Page) knew, there was no opposition to the application.

Questions were then put to the Engineer (Mr. N. M'K. Barron), who, in reply to them, stated that under the Corporation Water Act of 1908 the water area had increased by seven parishes; the additional population outside the city being 7600. The area of the old water district and the new one was 50,756 acres. It was not decided to supply water to all the extra-parishes at first. After furnishing particulars as to the storage and consumption of water, Mr. Barron said the borehole at Elkesley was now 550 feet down, and it was intended to carry it to a depth of 600 feet.

Mr. R. Epton, on behalf of the Ratepayers' Association, asked if the Corporation would keep their promise to borrow the required money for as long a period as possible. Mr. Page replied that he might rely upon the Corporation spreading the borrowing of the money over as long a time as they were allowed.

The inquiry then closed; and the Inspector visited the sites of the proposed works.

METROPOLITAN WATER BOARD.

Superannuation Scheme Adopted—Salary for the Chairman.

At the Meeting of the Metropolitan Water Board last Friday, the Finance Committee presented an exhaustive scheme for the superannuation of the staff, and recommended the establishment of a superannuation and provident fund. They also asked for the sanction of the Board to the expenditure of a sum not exceeding £5500 in respect of the establishment of the fund. Lord Welby stated that after the scheme had been settled by the Finance Committee and approved by the General Purposes Committee, they communicated with a Committee of the staff, in order to see whether they had any representations to make. The staff had made certain recommendations; and they had received the Finance Committee's careful consideration. After they had examined a number of local schemes of superannuation, they found that contribution was practically the rule in public bodies. Under these circumstances, they had placed before the Board a voluntary scheme founded upon these conditions. The amount to be contributed by the officers would be £8000, and the Board's contribution would be about £9000. In dealing with the question of pensions, the Committee decided that a fund should be created so as to realize 3½ per cent., and in twenty-five years, with the whole of the staff, the pensions would amount to from £17,000 to £20,000. At the outset, the Finance Committee reckoned that the charge would be £3500 to £3600, and it would grow each year; but, on the other hand, though it was a very large present charge, the Board were glad to establish such a scheme as would provide for those who had retired from their service. The clauses were then considered *seriatim*, and the scheme was adopted; the recommendations of the Committee being also agreed to.

The General Purposes Committee reported that they had had under consideration a memorandum from the Works and Stores Committee calling their attention to the fact that, under existing conditions, the expense of what might be termed the official hospitality of the Board fell personally upon the Chairman. The Committee expressed the opinion that such a state of things should not be allowed to continue, on the ground that it was wholly unreasonable that the Chairman of a public authority should be called upon to personally bear out-of-pocket expenses which arose consequent upon his official position. The Committee thought the proper course for the Board to pursue was to take advantage of the provisions of section 1 (4) of the Metropolis Water Act, 1902—viz., that the Board might pay to the Chairman and Vice-Chairman, or either of them, such salary or salaries as might be determined. The Committee unanimously recommended that a salary at the rate of £500 per annum should be paid to the Chairman of the Board (Mr. E. B. Barnard, M.P.) as from April 1, 1909. This was adopted with two dissentients.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

We had yesterday the ninety-third meeting of the Waverley Association of Gas Managers. The meeting was held in Edinburgh, and was presided over by Mr. W. Brown, of Lasswade—a *protégé* of the late Mr. William Young, of Peebles. Mr. Brown gave a concise, thoughtful address, which was adequately criticized; the criticisms showing how widely divergent views are held by gas managers upon the subject—surely a simple one—of the charging of differential rates for gas. Diversity, though not so pronounced, was also revealed in the matter of the conducting of prepayment meter business. Though on neither of the subjects was there anything said of an authoritative or convincing nature, as both subjects are work-a-day ones, the airing of the members' views upon them will probably be helpful to their brethren. The business for which the meeting will be remembered was that in connection with the presentation to Mr. A. Bell, sen., of Dalkeith, who is retiring from duty after a long and honourable career on account of the precarious state of his health (it being considered advisable that he should avoid excitement). Mr. Bell was unfortunately not present at the ceremony of presentation—a circumstance which, while it made the proceedings short and simple, robbed them of much that would have been of interest. Mr. Bell's retirement is a matter of universal regret—more universal than I have ever known with regard to any man in his

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 206.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 16	10	Alliance & Dublin 10 p.c.	17¼—18*	..	5 11 1
298,955	10	,,	7	Do. 7 p.c.	12½—12⅝*	..	5 9 10
310,000	Stk.	Jan. 14	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
200,000	5	Oct. 29	6¼	Bombay, Ltd.. . . .	5⅞—6	..	5 8 4
40,000	5	,,	6⅜	Do. New, £4 paid .	4⅜—4¾	..	5 15 6
50,000	10	Feb. 25	14	Bourne- } 6 p.c. .	28½—29½	..	4 14 11
51,810	10	,,	7	mouth Gas } B 7 p.c. .	16¾—17	..	4 2 4
53,200	10	,,	6	and Water } Pref. 6 p.c.	15⅜—16	..	3 15 0
380,000	Stk.	,,	12½	Brentford Consolidated	247—250	..	5 0 0
300,000	,,	,,	5⅛	Do. New	100—102	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref. .	122—124	..	4 0 8
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb. .	101—103	..	3 17 8
220,000	Stk.	Mar. 12	10⅝	Brighton & Hove Orig.	210—213	..	5 1 0
246,320	,,	,,	7½	Do. A Ord. Stk. .	152—155	..	5 0 0
460,000	20	Apl. 16	10	British	42—43*	+½	4 13 0
109,000	Stk.	Feb. 25	6	Bromley, Ord. 5 p.c. .	114—117	..	5 2 7
165,700	,,	,,	4½	Do. do. 3½ p.c. .	85—87	..	5 3 6
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd.	13⅛—13⅝	+⅛	5 1 10
250,000	Stk.	Dec. 11	4	Do. 4 p.c. Deb. .	94—96	..	4 3 4
100,000	13	—	—	Cape Town & Dis., Ltd.	4⅝—5⅛	..	—
100,000	13	—	—	Do. 4½ p.c. Pref. .	5—6	+⅛	—
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	48—50	..	6 0 0
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	77—79	..	5 13 11
157 152	Stk.	Feb. 25	5	Chester 5 p.c. Ord. . .	109—111	..	4 10 1
1,493,280	Stk.	Mar. 12	5⅛	Commercial 4 p.c. Stk..	106—109	..	4 15 5
560,000	,,	,,	5	Do. 3½ p.c. do. .	101—103	..	4 17 1
475,000	,,	Dec. 11	3	Do. 3 p.c. Deb. Stk.	81—83	..	3 12 3
800,000	Stk.	,,	6½	Continental Union, Ltd.	101—103	..	6 6 3
200,000	,,	,,	7	Do. 7 p.c. Pref.	138—141	..	4 19 3
491,270	Stk.	—	5	Derby Con. Stk. . . .	121—123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk. . . .	103—105	..	3 16 2
145,995	,,	Mar. 31	5	East Hull 5 p.c. Ord. .	97—99	+1	5 1 0
486,093	,,	Jan. 28	12	European, Ltd. . . .	23¾—24¼	..	4 19 0
354,063	70	,,	12	Do. £7 10s. paid.	17¾—18¼	..	4 18 5
15,161,545	Stk.	Feb. 11	4/10/8	Gas } 4 p.c. Ord. . .	103—104	..	4 7 0
2,620,000	,,	,,	3½	light } 3½ p.c. max. .	88—89	..	3 18 8
3,799,735	,,	,,	4	and } 4 p.c. Con. Pref.	105—107	..	3 14 9
4,193,975	,,	Dec. 11	3	Coke } 3 p.c. Con. Deb.	85—86	..	3 9 9
258,740	Stk.	Mar. 12	4⅝	Hastings & St. L. 3½ p.c.	93—95	..	5 0 0
82,500	,,	,,	6¼	Do. do. 5 p.c.	117—120	..	5 4 2
70,020	10	Oct. 15	11	Hongkong & China, Ltd.	18—18⅛	..	5 18 11
123,5°0	Stk.	Mar. 12	6½	Ilford "A" and "C" .	134—136	..	4 15 7
65,780	,,	,,	5	Do. "B"	103—105	..	4 15 3
51,000	,,	Dec. 30	4	Do. 4 p.c. Deb. . . .	102—104	..	3 16 11
4,940,000	Stk.	Nov. 13	8	Imperial Continental .	183—186	+½	4 6 0
473,600	Stk.	Feb. 11	3½	Do. 3½ p.c. Deb. Red.	95—97	..	3 12 2
195,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c. .	117—119	..	5 0 10

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Feb. 25	10	Liverpool United A. .	222½—224½	..	4 9 1
718,100	,,	,,	7	Do. B . . .	168—170	−1½	4 2 4
306 083	,,	Dec. 30	4	Do. Deb. Stk.	105—107	..	3 14 9
75,000	5	Dec. 11	6	Malta & Mediterranean.	4⅜—5	..	6 0 0
560,000	100	Apl. 1	5	Met of } 5 p.c. Deb.	100—102	..	4 18 0
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 13	3½	Monte Video Ltd. . .	12½—12⅝	..	5 9 10
1,775,892	Stk.	Feb. 25	4½	Newc'tle & G't'sh'd Con	107—108	..	4 3 4
518,795	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	91—93	..	3 15 3
15,000	10	Feb. 25	10	North Middlesex 10 p.c.	19½—20	..	5 0 0
55,940	10	,,	7 p c	Do. 7 p c	13—13½	..	5 3 8
300,000	Stk.	Nov. 27	8	Oriental, Ltd. . . .	140—142	..	5 12 8
60,000	5	Mar. 31	8	Ottoman, Ltd. . . .	6—6¼	..	6 8 0
31,800	53	Feb. 25	13	Portsea Island A. . .	135—137	..	5 0 7
60,000	50	,,	13	Do. B. . . .	129—131	..	4 19 3
100,000	50	,,	12	Do. C. . . .	119—121	..	4 19 2
114,800	50	,,	10	Do. D and E.	101—103	..	4 17 1
398,490	5	Oct. 29	7	Primitiva Ord. . . .	6⅞—7⅛	+⅛	4 16 7
796,585	5	Jan. 28	5	Do. 5 p.c Pref. .	5—5¼	..	4 15 3
488,903	100	Dec. 1	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
1,200,000	10	Oct. 15	8	River Plate Ord. . . .	14¼—14⅝	+⅛	5 8 6
312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
250,000	10	Mar. 31	8	San Paulo, Ltd. . . .	13¾—14	..	5 14 4
62,500	10	,,	—	Do. 6 p.c. Pref. .	11⅝—12	..	5 0 0
125,000	50	Jan. 2	5	Do. 5 p.c. Deb. .	49⅜—50½	..	4 19 0
135,000	Stk.	Mar. 12	10	Sheffield A	236—238	..	4 4 0
269,984	,,	,,	10	Do. B	235—237	−1	4 4 4
523,500	,,	,,	10	Do. C	234—236	..	4 4 9
70,000	10	Oct. 29	10	South African	14—14½	..	6 17 11
6,429,895	Stk.	Feb. 11	5/6/8	South Met., 4 p.c. Ord.	123—125	+1	4 5 4
1,895,445	,,	Jan 14	3	Do. 3 p.c. Deb.	85—86	..	3 9 9
209,820	Stk.	Mar. 12	8	South Shields Con. Stk.	152—154	..	5 3 11
605,000	Stk.	Feb. 25	5½	S'th Suburb'n Ord. 5 p.c.	120—122	..	4 10 2
60,020	,,	,,	5	Do. 5 p.c. Pref. .	122—124	..	4 0 8
117,058	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.	124—126	..	3 19 4
502,310	Stk.	Nov. 13	5	Southampton Ord. . . .	109—111	..	4 10 1
120,000	Stk.	Feb. 25	6¾	Tottenham } A 5 p.c. .	132—134	..	5 0 9
423,940	,,	,,	5¼	and } B 3½ p.c. .	109—111	..	4 14 7
149,470	,,	Dec. 30	4	Edmonton } 4 p.c. Deb.	101—103	..	3 17 8
182,380	10	,,	8	Tuscan, Ltd.	8¾—9¼	..	8 13 0
149,900	10	Jan.	5	Do. 5 p.c. Deb. Red.	100—102	..	4 18 0
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p.c. max.	105—107	..	4 13 6
255,6 6	Stk.	Feb. 25	6¾	Wands- } B 3½ p.c. .	131—133	..	4 17 9
79,416	,,	Dec. 30	3	worth } 3 p.c. Deb. Stk.	72—74	..	4 1 1
895,872	,,	Feb. 25	5½	West Ham 5 p.c. Ord. .	119—122	+1	4 6 1
210,000	,,	,,	5	Do. 5 p.c. Pref. . .	125—127	..	3 18 9
253,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk..	107—109	..	3 13 5

Prices marked * are "Ex div."

station. The reason for this I take to be the wide range of his knowledge and his ready application of it in all situations. He has a fund of illustration to draw upon which is marvellous. He has had a close connection with the Young family; and he can talk for hours of the wondrous attainments and doings of that gifted family. In his retirement—which we all hope may be a happy and comfortable one—he is to reside in Peebles, whither he removes on Tuesday. In that pleasant county town he will have the society of his worthy son, who is Manager there; and he will be surrounded by scenes which will recall, not days of toil, but of relaxation, when he basked in the intellectual radiance of his at one time pupil, but afterwards master—the late Mr. William Young.

The session of the Scottish Junior Gas Association closed to-night; the proceedings taking the form of a lecture upon suction-gas plants by Mr. Henry O'Connor. The Western District are to be complimented upon their selection of Mr. O'Connor as the lecturer. The subject he chose is one of supreme importance to producers of coal gas; and Mr. O'Connor did justice to it. His discourse was specially prepared for the occasion, and brought facts relating to the construction and efficiencies of suction-gas plants into focus in a way which is clear to the uninitiated, and must be exceedingly helpful to the engineer or the student who is brought into contact with this, the latest of gas problems. In treating the subject in the earnest and thorough way he did, Mr. O'Connor did honour to the Junior Association. That is only natural, as part of his work has for years lain among the young men of the profession. And if Mr. O'Connor did honour to the young men, it must be apparent, from the extensive and appropriate remarks which his lecture elicited, that he had also appropriately gauged the spirit, as well as estimated the attainments, of the coming generation of gas managers.

In the Town Council of Glasgow on Thursday, Mr. Galbraith referred to a report by the Town Clerk on the consolidation of the local Acts of Parliament. He stated that the City of Glasgow was governed by 93 local Acts of Parliament, over and above public general Statutes which were applicable to the whole country. These Acts went back to the year 1817. The Town Clerk pointed out that it would be almost impossible to obtain one Consolidating Act for the whole of them. Therefore he had come to the conclusion that it would be expedient to work in the direction of consolidating the local Acts and Orders applicable to the Corporation gradually, and according to departments. He suggested that they ought to begin by consolidating the local Acts and Orders applicable to the Gas Department. There were 36 Acts affecting this department. Mr. Galbraith moved that the report be approved generally, and that it be remitted to the Parliamentary Bills Committee, in consultation with the Gas Committee, to prepare and submit the draft of a Provisional Order for giving effect to the recommendation. The motion was unanimously adopted.

The Hamilton Town Council are about to promote a Provisional Order dealing with several departments of the Municipality. In the Gas Department power is to be asked to reduce the illuminating power of the gas to not less than 14 candles. At present the minimum is 16 candles, and gas of over 18 candles is supplied. Power is also to be asked to deal in gas-fittings of all kinds. In the finance clauses of the Order, the period sought for the repayment of borrowed money is sixty years. This is double the time that Parliament last year granted to the Edinburgh and Leith Gas Commissioners for the repayment of their loans, and it is doubtful if the Hamilton Corporation will succeed in that part of their application.

An inquiry, ordered by the Board of Trade, has been held in Greenock this week, in connection with an application by the Skelmorlie and Wemyss Bay Gas and Electricity Supply Company, Limited, for a Provisional Order empowering them to supply electricity. Mr. M'Clure, K.C., for the promoters, stated that the Company had for forty years supplied gas throughout the district which it was proposed to make the compulsory area. It was first of all a private Company; but thirty-three years ago it became a limited liability concern, and was accepted by the rating authority in Ayrshire as the authority to supply gas within their area. What was proposed to be done now was to take power to supply electricity, as an alternative to gas, in the event of their consumers wishing it. In the evidence which was led for the Company, Mr. Dunn, the Chairman, said they had ample capital for the undertaking. Lord Inverclyde stated that he at present uses the gas supplied by the Company, and has a private supply of electricity for lighting purposes. From what he knew of the *personnel* conducting the Company, he thought they would be quite a proper body to entrust with the scheme. He was satisfied with their supply of gas. The result of the inquiry has not yet been announced.

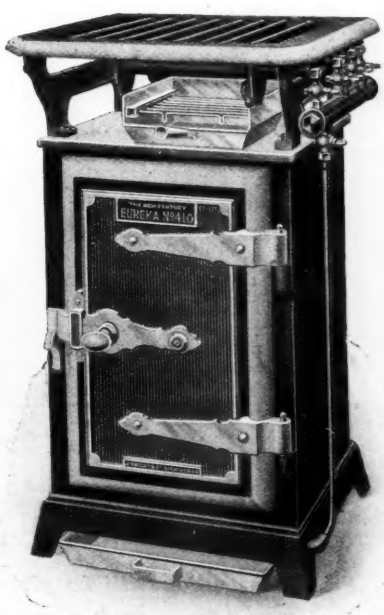
A rotary station meter of 30,000 cubic feet capacity has just been installed in the Vale of Leven Gas Company's works, Alexandria, to the instructions of Mr. John Lang, the Company's Engineer, under the supervision of Mr. D. Macfie, of Edinburgh, the agent in Scotland for the Rotary Meter Company.

Primitiva Gas and Electric Lighting Company of Buenos Ayres, Limited.—The report of the Directors of this Company for the year 1908 sets forth that the balance of revenue account for 1908 and the interest received from the German Transatlantic Electricity Company amount to £120,189, to which is added transfer fees and the balance brought forward, making £136,128. An interim dividend of 2s. 6d. per share (free of tax) on the ordinary shares has been paid, and £10,000 placed to the general reserve account; and there remains to the credit of the profit and loss account a balance of £44,903. The Directors recommend a final dividend of 4s. 6d. per share (free of tax), making 7 per cent. for the year on the ordinary shares, which will absorb £18,000; leaving £26,903 to be carried forward. There was a steady increase in the demand for cooking and heating stoves during the past year. Considerable extensions were made in new offices at the works and show-rooms, as well as in the distributing system.

43 Years of Progress!

1909

1866



THE

"EUREKA"

We were the Pioneers of the Gas Stove Industry.

JOHN WRIGHT & CO.,
ESSEX WORKS,
BIRMINGHAM.

90 per cent. of the Gas Undertakings in the United Kingdom supply our goods to-day.

192

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 24.

Sulphate of Ammonia.

The market has been quiet all through the week, and the tendency of prices has again been in favour of buyers. The large makes continue to be delivered against contracts, and the output from gas-works is now a diminished quantity, so that, although fresh direct orders have been scarce, there has been no great depreciation in values. Home demand has been fairly well sustained notwithstanding the approach of the end of the season. The closing prices are £11 7s. 6d. per ton f.o.b. Hull, £11 8s. 9d. per ton f.o.b. Liverpool, and £11 12s. 6d. per ton f.o.b. Leith. The forward position remains very much as last reported. There are sellers of July-December at £11 12s. 6d. per ton f.o.b. good ports, and of January-April, 1910, at £12 per ton; but these prices are 2s. 6d. to 5s. per ton above the ideas of buyers, and concessions would have to be made to induce business.

Nitrate of Soda.

The spot market is a shade easier at 10s. 3d. per cwt. for 95 per cent., and 10s. 6d. for refined quality.

LONDON, *April* 26.

Tar Products.

Tar products have been steady during the past week, and prices were fairly well maintained all round. Pitch is very firm, and manufacturers are advancing their prices. At present, buyers, and those on the Continent in particular, are slow in responding to the advance demanded, and seem to look to a set-back similar to that which took place during the last improvement in October. There are no signs of this, however, in England just now; and it is probable that the market is in a healthier state altogether than was the case then. Creosote is quiet; and though the majority of makers are maintaining their former quotations, yet sales are known to have taken place for fair quantities at a reduction. Benzols and toluol continue very weak. Solvent is steady; and carbolic is improving, with makers disinclined to sell except for near delivery. Crystals are still quiet and difficult to dispose of, but stocks are gradually being reduced. Naphthalene is unchanged; and crude salts are in fair demand. Tar is being keenly competed for.

The average values during the week were: Tar, 13s. 3d. to 17s. 3d., *ex* works. Pitch, London, 24s. 6d. to 25s.; east coast, 24s. to 24s. 6d.; west coast, 23s. 6d. to 24s. 6d. f.a.s. Mersey ports, 24s. to 24s. 6d. f.o.b. others. Benzol, 90 per cent., casks included, London, 6d.; North, 5d. to 5¼d.; 50-90 per cent., casks included, London, 6¼d. to 6⅜d.; North, 6d. to 6¼d. Toluol, casks included, London, 8¼d. to 8½d.; North, 7⅞d. to 8d. Crude naphtha, in bulk, London, 3½d. to 3¾d.; North, 2⅞d. to 3¼d.; solvent naphtha, casks included, London, 10⅜d. to 11d.; North, 9⅞d. to 10d.; heavy naphtha, casks included, London, 10⅜d. to 11d.; North, 9⅞d. to 10d. Creosote, in bulk, London, 2⅞d. to 2 13/16d.; North, 2½d. to 2⅝d. Heavy oils, in bulk, 2⅞d. to 3d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 1d. to 1s. 1½d.; west coast, 1s. to 1s. 0½d. Naphthalene, £4 to £8 10s.; salts, 35s. to 37s. 6d., packages included and f.o.b. Anthracene, "A" quality, 1¼d. to 1⅜d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article is quiet, and there appears to be very little buying for the end of the month's delivery. The tone is certainly easier, and one would not be surprised to see a slight fall in price. To-day, Beckton prompt is quoted £11 17s. 6d.; but no business is reported to have been done at this figure. For ordinary makes on Beckton terms, £11 7s. 6d. is asked; and £11 7s. 6d. is also the price in Hull. In Liverpool, £11 10s. would be accepted. In Leith, the manufacturers are asking £11 15s., but cannot obtain this figure—in fact, in most cases, the best bid obtainable is £11 12s. 6d.

COAL TRADE REPORTS.

Northern Coal Trade.

There is now much activity in the coal trade; and with the opening of the Baltic season close at hand, there is to be expected a continuance of this briskness. In the steam coal trade, best Northumbrians are now from about 11s. 9d. to 12s. 6d. per ton f.o.b., and second-class steams are from 10s. to 10s. 9d. Steam smalls are in heavier demand for export, and are quoted from 5s. 3d. to 6s. 3d. The production at the collieries is now fully normal, and is well taken up; and the coal-owners have the benefit of the reduction of wages which has come into force. In the gas coal trade, the consumption is good for this season of the year; and the prices are well maintained, especially for best kinds. For Durham gas coal, the general quotation is from 9s. 3d. to 10s. 6d. per ton f.o.b., according to quality; while for "Wear specials," up to 10s. 9d. is quoted. The export demand for good gas coals seems heavy; and this has stiffened the prices. For contract quantities, the request is less for the South of England; but from Italy there is a strong inquiry. A sale has been made for Genoa at as high as 17s. 6d. per ton at that port—the best price for perhaps five months. Other sales are also in course of negotiation, which should strengthen the market. Coke is steadier. Gas coke shows very little alteration—being quoted at 12s. 9d. to 13s. 3d. per ton f.o.b. in the Tyne or Wear.

Scotch Coal Trade.

There is reported to be a slight improvement in trade, though the quotations do not give much strength to the view. Splint is said to be in better demand, but that is for forward delivery. Other sorts show no tendency to advance, but rather the reverse. The prices quoted are: Ell 8s. 9d. to 10s., splint 10s. 3d. to 10s. 6d., and steam 9s. to 9s. 3d. per ton f.o.b. Glasgow. The shipments for the week amounted to 303,072 tons—a decrease of 599 tons upon the previous week, and 16,338 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,775,675 tons—an increase of 236,409 tons upon the corresponding period.

BUILT BY THE PARKINSON STOVE CO., LTD.

This COOKER is giving GREAT SATISFACTION

to Consumers and Gas Undertakings alike.

Prompt attention will be given to your requirements by

THE PARKINSON STOVE CO., LTD.

(INCORPORATING MAUGHAN'S PATENT GEYSER CO.)

BIRMINGHAM: Stour Street. LONDON: *Office and Show-Room:* 129, High Holborn, W.C.

A Novel Method of Fixing Blame.

On the morning of Saturday, the 10th inst., a fire broke out in a shop occupied by Mr. Isaac Goldman, a general dealer, carrying on business in Fowler Street, South Shields. It occurred among a quantity of small-ware goods in the window, and was put out by the brigade before much damage had been done. The local paper was discreetly silent on the subject of the cause of the fire; but the occupier of the premises was less reticent. He put up a huge placard, extending to more than the width of the shop, apprising the passers-by of the facts in the following terms: "The 'Shields Gazette' did not state the cause of outbreak of fire in my shop window. It was caused by electric live wire burning the bottom of window. Sheer neglect on the part of electric lighting officials. The live wire should not have been there. I do not use electric light. I do not see why this should be kept quiet. This live wire had been for years to the danger of the public. *They have now removed the wire.*" As the shop is situated in one of the main thoroughfares, the placard attracted considerable attention, and crowds of people congregated in front of it. Indeed, the numbers became so great a few days ago that the police authorities deemed it advisable to ask Mr. Goldman to take down the placard, as it was the cause of impeding traffic.

Devon Gas Association.—The third annual meeting of the Association was held at Exeter on Monday last week—Mr. F. Templer Depree, J.P. (the Chairman), presiding. The Association own gas-works at Chagford, Chudleigh, Moretonhampstead, and Brent, all of which were stated to be in first-class order. The Chairman reported a favourable year's working; and a dividend of 5 per cent. per annum was declared. The Association are making increased progress under the new Superintendent (Mr. B. L. Taylor); and the continued prosperity of the concern is hoped for.

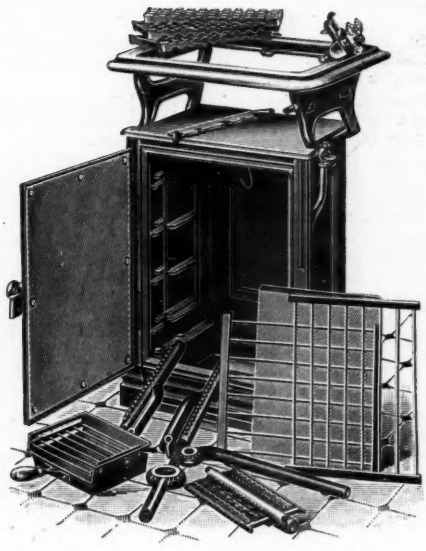
New Joint-Stock Companies.—The Salsbury Light Company, Limited, has been registered with a capital of £10,000, in £1 shares, to acquire the business carried on at No. 124, Long Acre, W.C., as Salsbury and Son, Limited; to adopt an agreement with H. Salsbury and F. Naylor; and to carry on the business of manufacturers of, and dealers in, lamps, &c. The Fraserburgh Gas Company, Limited, was registered in Edinburgh last week. The purpose is to take over as a going concern the Fraserburgh Gaslight Company. The capital is £27,000, in 13,500 shares of £2 each.

Sales of Stocks and Shares.—At the Lion Hotel, Guildford, Messrs. Emery and Sons recently offered for sale £1930 of consolidated ordinary stock and £35 of 5 per cent. preference stock of the Guildford Gas Company. All the lots offered were sold; £118 15s. to £120 per £100 being paid for the consolidated ordinary stock, while the parcel of preference stock fetched £42 15s. At the White Hart Hotel, Lewes, last Tuesday, Messrs. Chapman and Martin sold by auction four lots of five £10 shares (fully paid) in the Uckfield Water Company, at £50 per lot. Two £100 debentures (3½ per cent.) in the Uckfield Gas Company, Limited, were sold for £92 and £97 10s. respectively; another bearing 3 per cent. interest fetching £92. Good prices were obtained for the shares in the Slough Gas Company offered for sale by Messrs. Buckland and Sons, at the Royal Hotel, Slough, on Tuesday last. Four original ordinary £10 shares, carrying a dividend of £11 10s. per cent., fetched £25 each; and forty new ordinary shares, of like nominal value, on which a dividend of £8 1s. is paid, realized £17 5s. and £17 7s. 6d. apiece.

APPLICATIONS FOR LETTERS PATENT.

8731.—Pudney, F., "Mantles." April 13.
8735.—Wiswedel, A., "Gas-fitting." April 13.
8782.—Pace, P. C., "Petrol lighting and heating." April 13.
8796.—Miller, S., "Pumps and exhausters." April 14.
8804.—Eadie, A., and Tannahill, J., "Pipes." April 14.
8819.—Brown, E. S., "Gas-cocks." April 14.
8848.—Hunt, P. C. H., "Receiving coke from gas-retorts, and delivering or directing such coke into a furnace, or alternatively to a conveyor or trucks for depositing it where required." April 14.
8855-6.—Rossbach-Rousset, F., "Controlling gas-burners from a distance." April 14.
8902.—Stevenson, T. J., "Gas or other engines." April 15.
8913.—Clayton, L., and Clayton, Son, and Co., Limited, "Gas-holders." April 15.
8914.—Fabry, R. F. F., "Extraction of sulphuretted hydrogen from the gases evolved by coal distillation," April 15.
8918.—Piestrak, C. S., "Gas-engines." April 15.
8925.—Société Jules Grouvelle, H. Arquembourg et Cie., "Gas-intake, enabling gases of an explosion motor to be captured during their explosion, with a view to utilizing the pressure of such gases for various purposes." April 15.
8930.—Davey, H., "Gas-engines." April 15.
8940.—Hill, F. B., and Westwood, G. J. W., "Making a combustible heating and illuminating gas." April 15.
8968.—St. Laurent, E. J. S. de, and Pollux Syndicate, Limited, "Mantles." April 15.
8969.—St. Laurent, E. J. S. de, and Pollux Syndicate, Limited, "Production of light." April 15.
8970.—St. Laurent, E. J. S. de, and Pollux Syndicate, Limited, "Alloys." April 15.
9015.—Woodall, H. W., and Moon, P. G. G., "Regenerator gas-fire." April 16.
9057.—Masters, E., and Hansford, J., "Charging and discharging gas-retorts." April 16.
9139.—Ehrich and Graetz, "Incandescent lamps." April 17.
9149.—Wahl, G., and Bayerwaltes, A., "Inverted burners." April 17.

RICHMOND'S



"FIRST IN THE FIELD."

HAVE you SEEN Our New Slot Cooker?

We have always paid the closest attention to the construction of Slot and other Cookers, and we have now produced a Stove giving the very best possible results for gas consumed. It is to the interest of Gas Companies to supply a Stove which will give highest efficiency. Other **ADVANTAGES** besides efficiency in consumption are:—

(1) HOTPLATE BURNERS
(2) OVEN BURNERS
(3) BURNER CARRIER
(4) GAS BAR

INTERCHANGEABLE

and Removable, without Screws.

Advertisement of the RICHMOND GAS STOVE & METER CO., LTD.
London Offices and Show-Rooms: 132, Queen Victoria Street, E.C.
General Offices and Works: Warrington.

Suicide by Gas at St. Helens.—Last Friday, a sensation was caused in the district of Cowley Hill, St. Helens, by the discovery of a double tragedy at the residence of a glass-worker named George Mason. He was living in the house with his son, a boy eight years of age; his wife having left him. He had been for several weeks in poor health, and was in reduced circumstances owing to absenting himself from work; and the neighbours noticed that he was very depressed. As no one was heard moving about the house, suspicion was aroused, and the police entered the building, and found both occupants dead in bed. The man's head was enveloped in a pillow-case, and near his mouth was the end of an india-rubber tube attached to the gas-bracket. It was assumed that he had first taken his son's life and afterwards committed suicide.

The St. Ives Town Council have accepted the tender of the Staveley Coal and Iron Company, Limited, for cast-iron pipes, at £5 19s. per ton, and £10 for specials.

The Directors of the Buenos Ayres (New) Gas Company, Limited, recommend a final dividend of 4 per cent.; making, with the interim dividend, 7 per cent., free of tax, for the past year.

The Gas and Electricity Departments of the Rochdale Corporation will hand over from profits £14,000 in aid of the rates this year, or £1000 more than was contributed last year. The rates of the borough have been fixed at 7s. 10d. in the pound, or an increase of 1d.

The fusing of an electric wire set fire last Saturday morning to a private house in Colchester; and it was to the plucky action of a maid in climbing out of her bedroom and walking along a high parapet to give the alarm that the other inmates of the premises owed their rescue.

The Clacton Urban District Council have unanimously agreed that the whole of the street-lamps be provided with incandescent burners; an experiment tried on a certain number of lamps having proved very satisfactory. The Council are the owners of the electricity undertaking; but the current is not utilized for public lighting.

The Bridlington Gas Company, under the general supervision of Mr. J. Kelly, the Secretary and Manager, recently arranged with the Richmond Gas Stove and Meter Company, Limited, to thoroughly canvass the whole of their district; and, in conjunction, an exhibition of domestic appliances was held in the Peoples Palace. Over 100 stoves were hired out—making a total of more than 1500 cookers in use. Messrs. Richmond have secured the renewal of their contract for the supply of cookers, &c., to this Company for a further period of five years.

The following is a copy of an advertisement that the Hornsey Corporation Electric Light Department are parading through the streets by means of six sandwich-board men: "In spring instal electric light. Results: Decoration expenses lowered; clean house; convenient and economical lighting; healthy atmosphere. Particulars: Electrical Works, Tottenham Lane, Hornsey, N." On the other side, these words appeared: "Instal electric light when spring cleaning."

The Gas Committee of the Manchester Corporation have discussed the position of the department in reference to the Territorial Force. It has been decided that members of the department who are in the force shall receive full pay while in camp; but the Committee state that they are anxious they should be informed when men propose to join the force, in order that arrangements may be made to enable the work of the department to proceed without interruption during the time the men are in camp.

Among recent orders which Messrs. Joseph Taylor and Co. have in hand are saturators of their latest make for the British Gaslight Company (Hull station) and the Ipswich Gas Company; also three solid-plate lead saturators, with acid-tanks, draining-tables, and all accessories, for Messrs. Simon-Carvès, Limited, Manchester. They have had further orders for saturator and drainer, acid-tanks, &c., for the Coal Distillation Company, of Middlesbrough, and for a 5 ft. 6 in. diameter circular self-emptying saturator for the Mitchell Main Colliery Company, Limited. Other orders for saturators have been received for chemical works and coke-oven plants.

A gas exhibition, to remain open a fortnight, was recently opened at Hull by Mr. John Young, the Engineer and Manager of the British Gaslight Company's works. After calling attention to the features of the exhibition, he said Yorkshire ladies were noted for their cooking; but many of them had not yet realized the fact that the perfection of cooking could be obtained by gas. It could be turned on and off when required, and was not only economical, but cleanly. It had been said that the days of gas for lighting were numbered; but he claimed that it was still easily first. For a pennyworth of gas used through an incandescent burner, they could have a light equal to 60 candles for ten hours. A pennyworth of gas would cook a dinner for eight persons, or it would heat a room for an hour-and-a-half. A pennyworth of gas would produce 2-horse power in a gas-engine for an hour; or used on the high-pressure lighting system, it would give a light equal to 4500 candles for half-an-hour. The exhibition contains all the latest features of such shows—including an excellently got-up suite of fitted rooms.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

Secretary and Manager. Crewkerne Gas Company. Applications by May 5.
Traveller (Gas Plant). No. 5088
Maintenance of Incandescent Burners, &c. Staines and Egham Gas Company.
Fittings and Meter Inspector. Bangor (Wales) Gas Department. Applications by May 5.

Situations Wanted.

Agency. No. 5087.
Gas-Fitter. No. 5086.
Gas Manager or Assistant. No. 5089.
Secretary, Manager, or Accountant. Mimmack, St. Paul's Cray, Kent.

Plant, &c. (Second-Hand), for Sale.

Boiler (Vertical). Devonport Gas Department.
Hydraulic Main, Valves, Mouthpieces, &c. Whittington Gas-Works.
Hydraulic Mains, Arch Pipes, Mouthpieces, &c. Lichfield Gas Company.
Purifiers, &c. Sutton Gas Company.
Purifiers, &c. Uxbridge Gas-Works.
Retort Fittings, Condenser, Scrubbers, Exhausters, Purifiers. Cardiff Gas Company. Tenders by May 1.

Patent Licences.

Mantle Manufacturing Machines. Haseltine, Lake, and Co., Southampton Buildings, W.C.

Capital to Invest (Gas or Water Company).

No. 5085.

Stocks and Shares.

Aldershot Gas and Water Company. May 18.
Bromley and Crays Gas Company. May 11.
Chigwell, &c., Gas Company. May 18.
Cromer Gas Company. May 11.
Eastbourne Gas Company. May 11.
Gosport Gas Company. May 17.
Guildford Gas Company. May 11.
Hornsey Gas Company. May 11.
Ilford Gas Company. May 11.
Lea Bridge Gas Company. May 11.
Maidstone Gas Company. May 11.
Pinner Gas Company. May 11.
Romford Gas Company. May 11.
Southend Gas Company. May 11.
Southgate Gas Company. May 11.
Tendring Hundred Water Company. May 18.
Wandsworth and Putney Gas Company. May 11.

TENDERS FOR

Coal and Cannel.

Burton-on-Trent Gas Department. Tenders by April 30.
Congleton Gas Department. Tenders by May 8.
Cranleigh Gas Company. Tenders by May 8.
Denton Gas Department. Tenders by May 3.
Droitwich Gas Department. Tenders by May 8.
Eastbourne Gas Company. Tenders by May 6.
Heywood Gas Department. Tenders by May 11.
Matlock Bath and Scarthin Nick Gas Department. Tenders by May 8.
Paignton Gas Company. Tenders by May 8.
Ramsgate Gas Department. Tenders by May 10.
Shrewsbury Gaslight Company. Tenders by May 22.
Todmorden Gas Department. Tenders by May 15.
Wakefield Gas Company. Tenders by May 1.
Wilmslow and Alderley Edge Gas Company. Tenders by May 10.

General Stores - Block Tin, Pig Lead, &c.

Rhondda Gas and Water Department. Tenders by May 7.

Meters.

Sutton-in-Ashfield Urban District Council. Tenders by April 30.

Oxide (New and Spent).

Blackburn Gas Department.
Hinckley Gas Department. Tenders by May 3.

Pipes, &c.

Winsford Gas Department. Tenders by May 11.

Retort-House and Retort-Stack Construction.

Knutsford Light and Water Company. Tenders by May 12.

Retorts and Furnaces, &c., Resetting.

Winsford Gas Department. Tenders by May 11.

Sulphate of Ammonia Plant.

Rhondda Gas and Water Department. Tenders by May 7.

Tar and Liquor.

Denton Gas Department. Tenders by May 3.
Matlock Bath and Scarthin Nick Gas Department. Tenders by May 8.
Romford Gas Company.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
Palmerston House,
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WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
Andrew Stephenson, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

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WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
Repairs receive prompt attention.
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ANY QUANTITY. ANY PORT. ANY STATION.
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JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

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(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
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SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated Wm. Pearce & Sons, Ltd.
36, Mark Lane, London, E.C. Works: Silvertown.
Telegrams: "Hydrochloric, London."
Telephone: 341 Avenue.

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ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

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SPENT OXIDE PURCHASED IN ANY DISTRICT.

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CHARLES E. FRY, LEAMINGTON,

General Manager (for Scotland)—

J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

BROTHERTON & CO., LIMITED. Offices: City Chambers, LEEDS. Correspondence invited.

LUX'S GAS PURIFYING MASS. See Advertisement on p. 191. FRIEDRICH LUX, LUDWIGSHAFEN-AM-RHEIN.

KINGS Patent Agency, Limited, 165, Queen Victoria Street, London, E.C. Director Benj. T. King, A.I.M.E., British Chartered Patent Agent (Regd. by Exam.). Telep. 682 Central. Teleg. "Geologic," London. We sustain over quarter of a century's Experience and Reputation for Patenting Inventions and Registering Trade Marks throughout the World. Write or call. We attend and advise you free.

OXIDE OF IRON FOR GAS PURIFICATION.

Please Address Inquiries for Analysis and Prices to the

NEW WESTBURY IRON COMPANY, LTD.,

WESTBURY, WILTS.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere. FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia. BROTHERTON AND CO., LTD., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

D. ANDERSON AND COMPANY, GAS LIGHTING ENGINEERS AND CONTRACTORS, 18 & 20, FARRINGDON ROAD, LONDON, E.C.

Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

AMMONIACAL Liquor wanted. CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS. Telegrams: "CHEMICALS."

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants. We guarantee promptness, with efficiency for Repairs. JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON. Telegrams: SATURATORS, BOLTON. Telephone 0848.

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FOR REALLY HIGH-CLASS

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J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

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HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no back Pressure.
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SIMULTANEOUS Discharging-Charger. The one Machine which Discharges and Charges at One Stroke.

See Advertisement, April 6, p. II. of Centre.

ALDRIDGE AND RANKEN,

33, VICTORIA STREET, WESTMINSTER, S.W.

Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

SPENCER'S PATENT HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.

See Illustrated Advertisement April 6, p. 5.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by

CHANCE AND HUNT, LIMITED,

Works: OLDBURY, WEDNESBURY, AND STAFFORD.

Address Correspondence and Inquiries to OLDBURY, WORCS.

Telegrams: "CHEMICALS, OLDBURY."

AMMONIACAL Liquor wanted. BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

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National Telephone 7002. Telegrams: "UPRIGHT."

Apply, **THOMAS HORROCKS**

Albert Chemical Works, BRADFORD,

MANCHESTER.

Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Sulphate of Ammonia.

GAS OILS.

MEADE-KING, ROBINSON, & CO. Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

AMMONIA. Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

"HALLITE" Asbestos High-Pressure Sheeting. HALLITE DOUGLAS, LIMITED, 106, Leadenhall Street, LONDON, E.C.

DESSAU PATENT VERTICAL RETORTS.

FOR list of Installations, see "Journal," April 20, p. I. of Centre.

THE DESSAU VERTICAL RETORT COMPANY, Care of Mr. CHARLES HUNT, Consulting Engineer, 17, Victoria Street, WESTMINSTER, S.W.

GAS TAR wanted, BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

PINCHBECK'S Meters and Burglar PROOF STRONG BOX.

See illustrated advertisement, April 13, p. I. of Centre. PINCHBECK LIMITED, Adams Place, George's Road, HOLLOWAY, N.

"NUGEPE" GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO., LOWER MOSS LANE, MANCHESTER, S.W.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.

It is also used for the enrichment of Gas.

Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.

Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought. J. WILSON, Pleasant Grove, York Road, King's Cross, LONDON, N.

ADVERTISER has a Large Fund to INVEST in any Genuine Water or Gas Company. Address No. 5085, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MR. W. B. MIMMACK, for many years Secretary, Manager, and Accountant of the Crays Gas Company (111 Millions), now in Amalgamation, seeks APPOINTMENT in any or all of these Offices. St. Paul's Cray, KENT.

GAS-FITTER requires Situation. Good in Iron and Compo., Slot Installations, Meter Inspection, Incandescent Lighting, and all class of Companies' Work. Gas Company's Apprenticeship. Ten Years' Experience. Age 24. Excellent References. Address No. 5086, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER (Age 25), son of a well- known Gas Engineer, desires Situation as MANAGER of small Works, or ASSISTANT on large. Five Years' Practical Experience of Gas Manufacture and Distribution. Two Years Retort Setting. Competent Draughtsman, Chemist, and Book-Keeper. Excellent Testimonials. Disengaged. Address No. 5089, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS APPARATUS—A well-known REPRESENTATIVE, with a Wide Connection, having Terminated his recent Engagement, Desires to Take up on Commission an AGENCY that, with active working, will yield a good Turnover. Address No. 5087, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Traveller for Coal-Gas Making Apparatus to REPRESENT a Firm of Contracting Gas Engineers in South Wales and Midland District, or Southern and Eastern Counties. Applicants must have had previous Experience.

Apply, by letter, Stating Age and Salary required, to No. 5088, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FITTINGS AND METER INSPECTOR.

THE Bangor (Wales) Corporation Gas Department require the Services of an Energetic Young MAN, of Good Address, to INSPECT Meters, Gas-Stoves, Incandescent Burners, &c., on Consumers' Premises. Men of Experience only need Apply. The Appointment to be for Six Months at 30/- per Week.

Apply, in own Handwriting, stating Experience, and with *copies* of not more than Three Testimonials, not later than May 5, 1909, to PRICE F. WHITE, Manager.

STAINES AND EGHAM GAS COMPANY, LIMITED.

REQUIRED by the above-named Company, a Smart, Intelligent, Young Man of Good Address, who thoroughly understands Interior Gas-Fittings, for the MAINTENANCE OF INCANDESCENT GAS-BURNERS, &c , competent to Advise Consumers and make himself Generally Useful. Wages, 55s. per Week.

Apply, by letter, stating Age, Experience, if Married, and References, to the SECRETARY, Gas Company's Offices, Causeway, STAINES.

CREWKERNE, SOMERSET.

THE Directors of the Crewkerne Gas Company are prepared to consider APPLICATIONS for the Post of SECRETARY and MANAGER of their Works.

The Make of Gas is about 20 Millions.

The successful Candidate will be required to devote his whole time to the duties of the Office.

Salary, £120 per Year, with a good House and Garden, Coal, and Gas free.

Applications, with recent Testimonials, to be sent to Mr. G. Slade, the Deputy-Chairman, on or before the 5th of May next.

Gas-Works, Crewkerne,
April 22, 1909.

FOR SALE—A 10 I.H.P. Vertical Boiler by Cochrane and Co., 6 ft. 6 in. high, 3 ft. diameter, Complete with necessary Fittings. In Good Condition.

Apply to W. P. TERVET, Corporation Gas-Works, DEVONPORT.

FOR SALE—Four 12-feet Square PURIFIERS, complete with Centre Valve, Connections, and Traveller; also another 12-feet Square BOX and One 18-feet by 12-feet BOX, with Valves and Connections.

Offers to the MANAGER, Gas-Works, UXBRIDGE.

FOR SALE—Three Purifiers, by Newton, Chambers, and Co., 20 ft. square by 5 ft. deep, Planed Joints, 18-inch Valves and Connections, with Bye-Passes, Travelling and Lifting Gear. In Good Condition. Being Removed for Extension.

Apply to the SECRETARY, Gas Office, Sutton, SURREY.

FOR SALE—Cheap, two lengths of D Section of Wrought-Iron HYDRAULIC MAINS, 25 ft. 6 in. by 2 ft. by 1 ft. 6 in., for Six Beds of Sixes, Dip Pipes, Arch Pipes, and Ascension Pipes Complete. Take-off at One End, with Two 8-inch Disc Valves; also Eighteen Self-Sealing Eccentric Screw Cast-Iron MOUTHPIECES, 20 in. by 15 in.

Apply to the MANAGER, Gas Company, Lichfield, STAFFS.

FOR SALE, Cheap, the undermentioned GAS PLANT:—

Kirkham's "STANDARD" WASHER-SCRUBBER to pass 250,000 cubic Feet per diem.
GASHOLDER, 3-Lift, 50 ft. dia., cap. 128,000 c.f.
EXHAUSTERS, 10,000 and 8000 cub. ft. per Hour.
4-inch Cast-Iron Vertical CONDENSER.
Wrought-Iron SCRUBBER, 9 ft. high by 3 ft.
Donkin's VALVES, 12-inch, 10-inch, 6-inch.

Apply to SAMUEL WHILE and SON, 60, Queen Victoria Street, LONDON, E.C.

FOR SALE—Four Lengths of Steel HYDRAULIC MAIN, 8 ft. 9 in. long, 18 in. by 20 in., with Division Plates and Dip Pipes for One Bed of Sevens, Two Beds of Sixes, and One Bed of Fives; also H Pipes and Ascension Pipes for same. Four 6-inch SEAL VALVES, TEES, and CONNECTIONS for 12-inch Foul Main, and TEES and COCKS for 6-inch Tar-Main. All in First-Class Condition. Also quantity of 22-in. by 16-in. Self-Sealing MOUTHPIECES.

No reasonable Offer refused.

Apply, H. H. EVEREST, the Gas-Works, Whittington, near CHESTERFIELD.

MANUFACTURING PLANT FOR SALE.

THE Directors of the Cardiff Gaslight and Coke Company invite OFFERS for the Purchase of PLANT, in good Working Condition, at their Bute Terrace Works, comprising:

RETORT FITTINGS.
CONDENSER.
AMMONIACAL LIQUOR SCRUBBER.
TOWER SCRUBBER.
ONE PAIR OF EXHAUSTERS.
ONE SET OF FOUR PURIFIERS.

The whole suitable for Gas-Works producing Half-a-Million Cubic Feet per Day.

Schedule, containing detailed Measurements and all Particulars, may be obtained on Application to Mr. H. Morley, C.E., Gas-Works, Cardiff.

Tenders to be received not later than the first post Saturday, May 1, next.

THE Romford Gas and Coke Company, Limited, invite TENDERS for the Surplus TAR, both Coal Gas Tar and Carburetted Water-Gas Tar, for Disposal from their Works during a period of Twelve Months.

Particulars may be obtained on Application to the Manager, Mr. W. D. CHILD, Gas-Works, Romford, ESSEX.

THE Sutton-in-Ashfield Urban District Council invite TENDERS for Dry, Ordinary, and Automatic METERS, for their requirements during the Year ending April 30, 1910.

Tenders, endorsed "Meters," must arrive here not later than April 30, 1909.

For any further Particulars, Apply to T. ROBINSON, Gas Manager, Sutton-in-Ashfield, NOTTS.

COUNTY BOROUGH OF BLACKBURN.
(GAS DEPARTMENT.)

TENDERS wanted for the Purchase of about 400 Tons of SPENT OXIDE OF IRON containing not less than 50 per cent. of Sulphur.

Offers to state a price per unit of Sulphur per ton for the Material put into Trucks at Blackburn.

SAMUEL R. OGDEN,
Engineer and Manager.

Municipal Offices, Blackburn,
April 19, 1909.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the Supply of COAL and CANNEL.

Specification and Form of Tender may be obtained upon Application to Mr. W. Whatmough, Gas Manager.

Sealed Tenders, endorsed "Coal," to be sent to me not later than Tuesday, May 11, 1909.

By order,
GEO. G. BOUCHIER,
Town Clerk.

Municipal Buildings, Heywood,
April 15, 1909.

HINCKLEY URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE above Council invite Tenders for the Supply of 100 Tons of OXIDE OF IRON, and also for the Purchase of 150 Tons of SPENT OXIDE.

Full Particulars may be obtained from Mr. Fred Lee, Gas Manager.

Endorsed Tenders to be sent to me not later than Monday, May 3, 1909.

By order,
A. S. ATKINS,
Clerk.

WAKEFIELD GASLIGHT COMPANY.

THE Directors of the above Company invite TENDERS for Screened GAS COAL and NUTS.

Sealed Tenders, endorsed "Tender for Coals," and addressed to the Chairman and Directors, to be sent in on or before Saturday, May 1, 1909.

Forms of Tender may be obtained on Application to the undersigned.

The lowest or any Tender not necessarily accepted.

H. TOWNSEND,
Engineer and Manager.

Gas-Works, Wakefield.

BOROUGH OF TODMORDEN.

THE Gas Committee invite Tenders for the Supply of COAL and CANNEL.

Specification and Form of Tender may be had on Application to the undersigned.

Sealed Tenders, endorsed "Coal," to be sent not later than the 15th day of May, 1909, addressed to the Chairman of the Gas Committee, Town Hall, Todmorden.

By order,
HY. TALBOT,
Engineer and Manager.

CRANLEIGH GAS AND COKE COMPANY, LIMITED

THE Directors of the Cranleigh Gas and Coke Company, Limited, invite TENDERS for the Supply of 1000 Tons of Good GAS COAL, to be Delivered at Cranleigh Station (L.B. & S.C. Rly.) as may be required during the Twelve Months from July 1, 1909, to June 30, 1910.

Tenders, endorsed "Coal," to be sent to the Secretary on or before May 8.

The Directors do not bind themselves to accept the lowest or any Tender.

No Form of Tender supplied.

H. J. HAYMAN,
Secretary.

Cranleigh, Surrey.

WINSFORD URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE above Council are prepared to receive TENDERS for the Supply of 800 Yards of 4-inch and 1100 Yards of 3-inch CAST-IRON PIPES, with Spigot and Socket Joints, Bends, Syphon Boxes, &c.

Tenders, endorsed "Gas-Mains," to be delivered to the undersigned on or before the 11th of May, 1909.

The Council are also prepared to receive TENDERS for RE-SETTING RETORTS and FURNACES, &c.

Tenders, endorsed "Gas-Retorts," to be delivered to the undersigned on or before the 11th of May, 1909.

Specifications and Forms of Tender may be obtained on Application to Mr. F. Sidwell, Manager, Gas-Works, Winsford.

The Council do not bind themselves to accept the lowest or any Tender.

JNO. H. COOKE,
Clerk to the Council.

Council Offices, Russell Street,
Winsford, Cheshire, April 23, 1909.

DENTON URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TAR.

THE Gas Committee invite Tenders for TAR, the same to be sent in on or before the 3rd of May prox.

Particulars may be obtained from the Gas Engineer, Mr. J. Chadwick Smith, Gas-Works, Denton, Lanc.

The Committee do not bind themselves to accept the highest or any Tender.

By order,
WILLIAM RICHARDS,
Clerk of the Council.

April 19, 1909.

DENTON URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

COAL.

THE Gas Committee invite Tenders for the Supply of COAL, the same to be sent in on or before the 3rd of May prox.

Specification and Form of Tender to be obtained from the Gas Engineer, Mr. J. Chadwick Smith, Gas-Works, Denton, Lanc.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM RICHARDS,
Clerk of the Council.

April 19, 1909.

DROITWICH CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the Supply of 1800 Tons of Best Screened GAS COAL or NUTS, to be delivered to Droitwich (G.W. Rly.) as required during the Twelve Months ending June 30, 1910.

The Committee reserve the right to accept Tenders for the whole or any portion of the Quantity offered, and do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Gas Coal," to be sent to the Town Clerk, Droitwich, not later than the 8th prox.

Forms of Tender to be obtained from the undersigned.

F. SHEWRING,
Manager.

Gas-Works, Droitwich,
April 20, 1909.

URBAN DISTRICT COUNCIL OF MATLOCK BATH AND SCARTHIN NICK.
(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Council are prepared to receive TENDERS for the Supply of 2000 Tons of Best Screened GAS COAL, to be Delivered at Matlock Bath Station during the Year ending the 30th of June, 1910, in Quantities as required.

The Council reserve the right to divide the Quantity into one or more Contracts.

Tenders to be accompanied by Working Analysis.

No Special Form of Tender; and the persons whose Tenders are accepted will be required to enter into the usual Contracts for the due performance thereof.

Tenders, sealed and endorsed "Tenders for Coal," should be sent to the undersigned not later than Saturday, the 8th of May.

E. RANDLE.

Council Chambers, Matlock Bath,
April 21, 1909.

URBAN DISTRICT COUNCIL OF MATLOCK BATH AND SCARTHIN NICK.
(GAS DEPARTMENT.)

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Council are prepared to receive TENDERS for the Surplus TAR and AMMONIACAL LIQUOR produced at their Works, together or separately, for the Twelve Months ending the 30th of June, 1910.

Tar (approximate Quantity), 120 Tons; Liquor (approximate Quantity), 220 Tons, not less than 5° Twaddel. Price scaled on 5° above, and delivered into Buyer's Tanks at Matlock Bath Station.

The Persons whose Tenders are accepted will be required to enter into the usual Contracts for the due performance thereof.

Tenders, sealed and endorsed "Tenders for Residuals," should be sent to the undersigned not later than Saturday, the 8th of May.

E. RANDLE.

Council Chambers, Matlock Bath,
April 21, 1909.

PAIGNTON GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Paignton Gas Company are prepared to receive TENDERS for the Supply of 4000 Tons of best approved GAS COALS, to be delivered in such Quantities and at such times as may be required, and to weigh 20 cwt. to the Ton over the Gas Company's Weighbridge.

Tenders to be accompanied by Practical Working Analysis, stating the Price of the Coal Delivered at Paignton Station (Great Western Railway), free of all Charges.

Forms of Tender are not supplied.

The Directors do not bind themselves to accept the lowest or any Tender.

Further Particulars may be obtained from Mr. C. G. Dawson, Gas-Works, Paignton.

Sealed Tenders, endorsed "Tender for Coal," specifying the Description and Quality of Coal, to be sent on or before the 8th day of May next, addressed to the undersigned, at the Gas Offices, 1a, Victoria Street, Paignton.

F. W. PUDDICOMBE,
Secretary.

Paignton, April 20, 1909.